APPLICATION OF THE THEORY OF ANTICIPATORY GUIDANCE TO IDENTIFY NUTRITION EDUCATION NEEDS, EATING DISORDER RISK AND NUTRITION KNOWLEDGE OF FRESHMEN AND SOPHOMORE COLLEGIATE ATHLETES

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ABSTRACT

THESIS: Application of the Theory of Anticipatory Guidance to Identify Nutrition Education Needs, Eating Disorder Risk, and Nutrition Knowledge and Attitudes of Freshmen and Sophomore Collegiate Athletes.

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A variety of health organizations, including the American Academy of Pediatrics and the American Dental Association, have employed the concept of anticipatory guidance to avert potential health risks among their patients. The application of anticipatory guidance with underclass collegiate athletes, however, has not been identified in the literature. The purpose of this mixed-methods, quasi-experimental study was to assess the eating disorder risk and nutrition knowledge of underclass Division I collegiate athletes at a Midwestern university and to determine the viability of using the theory of anticipatory guidance to identify the athletes' nutrition education needs related to six nutrition related key topics. Of the forty athletes who completed three assessments, results indicated a desire and a need for more nutrition information. The Sports Nutrition presentation significantly increased the sport nutrition knowledge among the collegiate athletes compared to the control group. Analysis of the EAT-26 survey indicated seven of the 40 athletes were at risk for an eating disorder; of these, almost half (43%) were female gymnasts. Applying anticipatory guidance early in an athlete's career may potentially prevent future health problems and enhance performance.

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CHAPTER I

INTRODUCTION

Background

In theory, anticipatory guidance prevents problems before they arise; it can be recognized as "heads up" advice. For decades, anticipatory guidance has been used by pediatricians and physicians to educate parents about landmark stages in children's development (Schuster, Nathau, Regalado, & Kletn, 2000; Nelson, Higman, Sia, McFarlane, Fuddy, & Duggan, 2003; Olson, Inkelas, Halfon, Schuster, O'Connor, & Mistry, 2004). Topics presented by providers include car restraints, nutrition, dental care, and reading aloud (Barkin, Scheindlin, Brown, Edward, Finch, & Wasserman, 2005). The American Academy of Pediatrics (AAP) defines anticipatory guidance as advice and education for patients and parents regarding appropriate preparation for predictable developmental changes (AAP, 2006). It is well documented that anticipatory guidance is positively favored by doctors and parents (Barkin et al, 2005; Coker, Lawrence, Casalio, Alexander, & Lantos, 2006; Nelson et al., 2003; Schuster et al., 2000).

Other areas of health have taken note of the highly reputable concept of anticipatory guidance. With today's epidemic of childhood obesity, parents have voiced a desire for anticipatory guidance on nutrition and exercise to help them cope with their

adolescents' obesity (Warkentin, Chan, Igric, Seabrook, Matsui, Lim, & Joubert, 2008). This preventative type of education has also been used to help parents anticipate the diagnosis, procedures, and expectations through various treatment stages of children with leukemia (Yamokoski, Hazen, & Kodish, 2008). However, only a handful of health organizations have employed the concept of anticipatory guidance to avert potential health risks. To date, the application of anticipatory guidance to identify the nutrition needs of freshmen and sophomore collegiate athletes has not been identified in the literature.

For the competitive or elite athlete, sports nutrition education can enhance training capacity, improve exercise performance, reduce the risk of injury, promote appropriate body weight and body fat percentage, and strengthen the immune system (Steinmuller, Meyer, Kruskall, Manore, Rodriguez, Macedonio, Bird, & Berning, 2009). Although it is recognized that physical activity, athletic performance, and recovery from exercise are enhanced by optimal nutrition (Rodriguez, DiMarco, & Langley, 2009), 44.8 percent of Division I athletes indicated they "seldom" or "never" received nutrition information (Jacobson, Sobonya, & Ransone, 2001). With this in mind, athletes may be at risk for not receiving optimal nutritional guidance.

College athletes are vulnerable to nutritional risks because of the rigorous demands of their sport and because of the realities of college lifestyles (Quatromoni, 2008). Freshmen find themselves in an environment where direct supervision is typically limited and the college lifestyle impacts energy balance and diet (Fromme, Corbin, & Cruse, 2008; Wengreen & Moncur, 2009). A study at a major university's athletic program currently described observations from a clinical practice and discovered the

highest risk groups were either freshmen or sophomores (Quatromoni, 2008). Disordered eating and eating disorders, such as anorexia nervosa and bulimia nervosa, are also prevalent among college athletes (Black, Larkin, Coster, Leverenz, & Abood, 2003). While females in lean-sports such as gymnastics and cross-country are at greater risk for disordered eating (Reinking & Alexander, 2005), males are not immune to disordered eating (Quatromoni, 2008). Studies have documented the impact of nutrition education interventions to improve knowledge and behavior among college athletes (Abood, Black, & Birnbaum, 2004; Bonci, Bonci, Granger, Johnson, Malina, Milne, Ryan, & Vanderbunt, 2008), but no research has been identified that has evaluated the impact of sports nutrition anticipatory guidance within this population.

Statement of Problem

College athletes are vulnerable to nutritional risks because of the rigorous demands of their sport and because of the realities of college lifestyles (Quatromoni, 2008). Anticipatory guidance, or "heads up" information, has been used for decades by pediatricians and physicians to educate parents about landmark stages in children's development (Schuster et al., 2000; Nelson et al., 2003; Olson et al., 2004), yet only a handful of health organizations have employed the concept of anticipatory guidance to avert potential health risks. If more fully understood, this technique could be used to help collegiate athletes – and potentially all underclass students who are living on their own for the first time – consume a healthier diet. The current lack of evidence, along with the rising prevalence of eating disorders and disordered eating among collegiate athletes, makes the identification of the effectiveness of applying the theory of anticipatory

guidance to advise underclass collegiate athletes about their personal nutrition needs and concerns a viable research problem.

Purpose of the Study

The purpose of this mixed-methods, quasi-experimental study was to assess the eating disorder risk and nutrition knowledge of freshmen and sophomore Division I collegiate athletes at a Midwestern university and to determine the viability of using the theory of anticipatory guidance to identify the athletes' nutrition education needs related to alcohol consumption, disordered eating and eating disorders, frequency of eating, hydration, training and competition nutrition, and overall energy consumption.

Research Questions

This thesis addressed the following central and sub-central research questions:

1. Was the theory of anticipatory guidance an effective way to identify appropriate nutrition education topics for freshmen collegiate athletes?
    a. Do underclassmen athletes desire the need for more nutrition information and advice?
    b. What nutrition information do they desire?
    c. If underclassmen collegiate athletes were given nutritional “heads up” advice to help cope with their transition to college, do they believe it would help them in their future athletic career?
    d. Based on the anticipatory guidance provided, how do underclassmen athletes plan to change personal eating habits?

e. Where do underclassmen collegiate athletes receive nutrition information?

f. From whom do underclassmen collegiate athletes feel comfortable requesting nutritional information (e.g., their coach, sport and conditioning coach, and/or any other personnel working with their specific team)?

2. Based on the results of the Eating Attitudes Test (EAT-26) used to identify the prevalence and risk of eating disorders and disordered eating among underclass collegiate athletes:

    a. Were male or female athletes at greater risk for eating disorders and/or disordered eating?

    b. Which sport(s) have the highest prevalence of athletes at nutritional risk?

    c. What is the prevalence of eating disorders/disordered eating among the underclassmen athletes?

3. Was the theory of anticipatory guidance an effective way to increase the nutrition knowledge of underclassmen collegiate athletes?

    a. When comparing pre- and post- sport nutrition questionnaire scores in relation to the nutritional anticipatory guidance, did males or females score higher?

    b. When comparing pre- and post- sport nutrition questionnaire scores, do freshmen or sophomores score higher?

    c. What sport(s) exhibited a greater knowledge of nutrition?

Rationale and Significance of Study

Anticipatory guidance has successfully been used in the medical field, most notably in pediatrics and in dentistry, to help provide parents and children with appropriate information to help them cope with changing situations. Limited information is available, however, on the use of anticipatory guidance in other fields. Specifically, there is a dearth of research that examines the use of this highly reputable concept of anticipatory guidance among college athletes. The purpose of this study was to identify if anticipatory guidance was a useful approach, by asking athletes through a qualitative survey their thoughts/attitudes regarding the heads up advice, to identify the nutritional needs and risk concerning collegiate freshmen and sophomore athletes. A nutrition knowledge questionnaire was given before and after the anticipatory guidance educational sessions to determine the nutrition knowledge change of score and impact of the information presented. The EAT-26 instrument was given to determine the eating disorder risk among the athletes at this Division I university. It was anticipated the results of this study will help sports dietitians, coaches, sports and conditioning coaches, athletic trainers, parents of athletes, and collegiate athletes by inducing athletic programs to focus on a more preventative effort to meet the nutrition education needs of underclassmen collegiate athletes, while concomitantly decreasing overall health risks.

Assumptions

The following assumptions were made in the development and implementation of the study and in the interpretation of the data:

- The athletes will be answering questions honestly;

- The anticipatory guidance presented to the athletes was representative of the type of nutrition information desired by the athletes;
- The two anticipatory guidance presentations were the same;
- The EAT-26 accurately discerns individuals with eating disorders and disordered eating;
- The nutrition knowledge questions asked in the survey instrument adequately reflect the information presented during the anticipatory guidance sessions.

Definition of Terms

- Anticipatory Guidance- age appropriate advice and education for a patient regarding preparation for predictable developmental changes in order to avert risk taking behavior patterns to promote healthy lifestyle choices.
- Dehydration- loss of >2 percent of body weight, hypo-hydrated (urine specific gravity of 1.020-1.029).
- Disordered Eating- one being somewhat-to-extremely dissatisfied with their body weight and engaging in at least one pathogenic weight control behavior in the past year. (e.g., Anorexia nervosa, Bulimia nervosa, Binge-Eating Disorder)
- Eating Disorders- medical illnesses with diagnostic criteria based on psychological, behavioral, and physiologic characteristics.
- Energy Consumption- the amount of caloric intake to provide sustainable energy.
- Female Athlete Triad- interrelated components of a serious nature: disordered eating, amenorrhea, and osteoporosis.
- Nutrition- the study of substances found in food that is essential to life.

- Nutrition Information Sources- resources freshmen collegiate athletes consulted to obtain nutrition information.
- Nutrition Intervention- purposefully planned action(s) designed with the intent of changing a nutrition-related behavior, risk factor, environmental condition, or aspect of health status.
- Sport-Enhancing Diet- any nutritional changes one makes to their usual diet to enhance athletic performance.
- Sport Nutrition- the study of substances found in food that is not only essential to life, but also important for peak athletic performance.
- Pathogenic Eating- One who may routinely engage in chronic dieting, fasting, laxative use, and/or self-induced vomiting during certain times of the year—for example, an in-season athlete trying to achieve or maintain a certain weight.
- Prevention- all activities designed to reduce the instances of an illness in a population.
- Vegetarian- generally four different types: 1) vegan- diet that excludes all animal products such as meat, poultry, fish, eggs, milk, cheese, and other dairy products; 2) lacto-vegetarian diet that excludes meat, poultry, fish and eggs, but includes dairy products; 3) lacto-ovo vegetarian diet that excludes meat, poultry, and fish, but includes eggs and dairy products (most vegetarians in U.S. fall into this category); 4) flexitarian- semi-vegetarian diet with a focus on vegetarian food with occasional meat consumption.

Summary

Little is known about the utility of using the theory of anticipatory guidance to advise freshmen and sophomore collegiate athletes about nutrition and sport. The purpose of this study was to assess the eating disorder risk and nutrition knowledge of freshmen and sophomore Division I collegiate athletes at a Midwestern university and to determine the viability of using the theory of anticipatory guidance to identify the athletes' nutrition education needs related to six key concepts. Results of this study can be used to induce athletic programs to focus on a more preventative effort to meet the nutrition education needs of freshmen and sophomore collegiate athletes, while concomitantly decreasing the overall health risks of the athletes.

CHAPTER II

LITERATURE REVIEW

The purpose of this mixed-methods, quasi-experimental study was to assess the eating disorder risk and nutrition knowledge of freshmen and sophomore Division I collegiate athletes at a Midwestern university and to determine the viability of using the theory of anticipatory guidance to identify the athletes' nutrition education needs related to alcohol consumption, disordered eating and eating disorders, frequency of eating, hydration, training and competition nutrition, and overall energy consumption. This chapter will present a review the literature to: 1) define and examine the impact of anticipatory guidance, with an emphasis on the origins and application of the theory in the field of pediatrics; 2) describe national policies that impact collegiate athletes; 3) provide an overview of sports nutrition concerns among collegiate athletes (e.g., alcohol consumption, disordered eating, eating disorder risk assessment, frequency of eating, hydration, training and competition, and overall energy consumption); 4) review the sport nutrition knowledge and sources of information used by college athletes (including other personnel within the athletic program); 5) provide an overview of nutrition education interventions used among athletes; and 6) advocate for the use of anticipatory guidance among underclassmen collegiate athletes (including the impact of nutrition interventions).

Theory of Anticipatory Guidance

In 1978, the American Academy of Pediatrics (AAP) developed a document entitled "The Future of Pediatric Education II" (FOPE II) to address changes needed in the field of pediatrics. This document described an educational plan for pediatricians and other health care professionals that would better prepare them to provide optimal care to patients in the future. Included in the plan was a concept called "anticipatory guidance." The AAP defined anticipatory guidance as "age-appropriate, individualized advice given to parents and their children in an effort to avert risk-taking behavior patterns and to promote healthy lifestyle choices" (American Academy of Pediatrics [AAP], 2006).

Anticipatory guidance is referred to by some as "heads up" advice. In theory, anticipatory guidance prevents problems before they arise. The theory of anticipatory guidance has been used by pediatricians and physicians to teach parents about landmark stages in children development (Schuster et al., 2000; Nelson et al., 2003; Olson, 2004). The number of topics discussed between the pediatrician or physician is unique for each patient, but it is recommended that fewer topics (between five and eight topics) during a doctor's visit help parents retain and recall the information (Barkin et al., 2005). Topics presented by pediatricians and other health care workers to their patients include information related to car restraints, nutrition, dental care, and reading aloud (Barkin et al., 2005). It is well documented anticipatory guidance is positively favored by doctors and parents (Barkin et al., 2005; Coker et al., 2006; Nelson, 2003; Schuster et al., 2000).

Schuster, Nathua, Regalado, & Kletn (2000) evaluated the impacted of six anticipatory guidance topics (e.g., How to care for a newborn [asked only for children <3 months old]; how to deal with children's sleeping patterns; what to do when a child cries;

how to help and encourage the child to learn; how to discipline the child [analyzed for children between 6 and 36 months old]; and how and when to toilet train the child [for children between 18 and 36 months old]), developed by the American Academy of Pediatrics (AAP), on a parent's desire to receive additional information on these topics. The results indicated 64 percent of parents were willing to pay an extra ten dollars a month to obtain additional information specific to their needs. The results of this study suggested parents have unmet needs for anticipatory guidance. The authors encouraged pediatricians to step beyond the biomedical model to address the patients' emotional, social, and developmental needs.

Olson, Inkelas, Halfon, Schuster, O'Connor & Mistry (2004) examined the frequency of anticipatory guidance by pediatricians. The authors indicated pediatricians reported discussing specific health-related topics with 75 percent or more of patients, depending on the age group of the child. The most frequently addressed topics were issues related to food and feeding, immunizations, words and phrases, and safety/injury prevention.

Anticipatory guidance established a positive reputation while, in theory, preventing problems before they exist. For example, mothers who were encouraged to read baby books that included anticipatory guidance had significantly higher knowledge scores than the non-educational book and no-book group. This could translate into safer and more developmentally appropriate parenting practices (Reich, Bickman, Saville & Alvarez, 2007). When parents were given injury prevention information to promote adoption of safety practices, they were more likely to report adopting a new injury prevention behavior than those receiving generic information (49 and 45%, respectively,

compared with 32%) (Nansel, Weaver, Jacobsen, Glasheen & Kreuter, 2007). Anticipatory guidance is not only important to the parent and child, but pediatricians and physicians believe it is an important time segment during the doctor's visit to provide valuable information (Coker et al., 2006; Schuster et al., 2000; Olson et al., 2004; Woolford, Clark, Lumeng, Williams & Davis, 2007).

As a result of the positive impact of anticipatory guidance in the pediatric care of infants and children, other areas in health care took notice and began to apply principles of anticipatory guidance into their education protocol. The American Dental Association (ADA), for example, encouraged dentists to apply anticipatory guidance to dental preventative education. This is an organized way for all dental providers to enjoy the attention of parents and be successful in preventative dentistry (Nowak & Casamassimo, 1995). The ADA suggested this individualized approach of anticipatory guidance could most likely be considered the next frontier in dental cavity reduction. An example of anticipatory guidance given by a dentist would be a discussion about dietary carbohydrates and their role in plaque development in children aged 12 to 24 months.

Anticipatory Guidance has been used to help prepare parents understand the required informed consent process needed to treat their child diagnosed with leukemia. Yamokoski, Hazen & Kodish (2008) provided nurses with supplemental information, materials, and more time to provide additional support and advice to parents using the model of anticipatory guidance as developed in general pediatrics. As a result, 86 percent of the parents reported anticipatory guidance made them more comfortable asking their child's doctor questions.

As other health care facilities and programs utilize the theory of anticipatory guidance, it is important to incorporate appropriate educational tools to complement and support the key educational concepts. Nutritional brochures used by dietitians, health education specialists, and others, for example, assist in communicating nutrition messages. Computer programs have also been developed to complement the anticipatory guidance process to increase parents' knowledge at well-child visits. Sanghavi (2005) developed interactive, self-guided, computerized tutorials to be used in a waiting room for parents to receive anticipatory guidance. These tutorials, lasting 10 to 20 minutes, were given at the 6-week and 4 months of age well-child visits. Compared to the control group, the intervention group had superior knowledge of various topics such as car seat use (49% vs. 31%), dental care (80% vs. 27%), and nutrition (43% vs. 21%). The results suggest complementing anticipatory guidance with additional education vehicles, such as printed materials or computerized tutorials, should be encouraged.

NCAA Policies that Impact Collegiate Athletes

The National Collegiate Athletic Association (NCAA), established in 1905, currently divides colleges and universities into three competitive divisions: I, II, and III. The purpose of the NCAA is to govern competition in a fair, safe, equitable and sportsmanlike manner and to integrate intercollegiate athletics into higher education so that the educational experience of the student-athlete is paramount (NCAA, 2010). The NCAA initiates changes in collegiate sports rules specific to each of the three divisions. The rules must be carried out through the athletic departments across the nation; if the rules are not followed, the university will receive sanctions that negatively impact the

university and its athletic department. The NCAA sponsors sports including baseball, basketball, cross country, fencing, field hockey, football, golf, gymnastics, ice hockey, lacrosse, rifle, rowing, skiing, soccer, softball, swimming, tennis, track, volleyball, water polo and wrestling; in addition, some institutions are introducing other emerging sports such as squash. In 2008-2009, approximately 421,169 student-athletes, on 17,814 teams around the nation, competed in various NCAA sports.

The schedule of a student-athlete is very demanding, with class, practice, and competition. The NCAA has specific rules concerning the amount of time athletes are allowed to practice and compete. Specifically, student-athletes can only practice twenty hours or less per week, with a maximum of four hours per day. Every institution is required to give athletes at least one day off (24-consecutive hours) from athletic-related activity. At most, 56 contests (games or scrimmages) can be played during one season. Every sport has specific rules and regulations that are outlined in the NCAA Constitution, Operating Bylaws, and Administrative Bylaws (Zgonc, NCAA, 2010).

One of the major NCAA programs is the mandatory Drug Testing program. The purpose of the program is to protect the health and safety of the student-athlete so no athlete has a drug-induced advantage or feels pressured to use chemical substances to enhance their performance. The NCAA maintains a list of banned substances including certain nutritional supplements. Random drug testing is conducted throughout each school year in order to make sure student-athletes are in compliance with the drug rules. It is extremely important for athletes to realize which substances are banned and which ones are allowed (Zgonc, NCAA, 2010).

The U.S. Food and Drug Administration, FDA, is responsible for regulating the supplement industry. However, the FDA does not have any control over what goes on the market. The safety and purity of these nutritional/dietary supplements is not promised as the supplement manufacturer is the entity responsible for making claims and proving the safety of any compound. The FDA cannot remove a compound from the market until its safety and efficacy has been called into question. These compounds are then heavily marketed to consumers and the general public, including collegiate athletes (U.S. Department of Health and Human Services & U.S. Food and Drug Administration, 2009).

Sports Nutrition

It is the position of the American Dietetic Association, Dietitians of Canada, and the American College of Sports Medicine, that physical activity, athletic performance, and recovery from exercise are enhanced by optimal nutrition. These professional organizations recommend appropriate selection of food and fluids, timing of intake, and supplement choices for optimal health and exercise performance (Rodriguez et al., 2009). Other than genetics and training, what an athlete eats is probably the most important determinate of success in sports.

Training and competition for most sports involves exercise at certain intensities and lengths of time and research can now provide athletes with scientific evidence to support particular dietary recommendations for athletes competing in various sports (Williams, 2006). Both males and females have specific energy and nutrient demands, depending on the sport and other pre-disposed conditions. Due to the sport and college

environment, these student-athletes face many unique challenges (Rosenbloom & Skinner, 2006). This review will examine the impact of nutrition in various areas of concern among collegiate athletes. Many athletes do not clearly understand the role of nutrition and athletic performance nor do most coaches and trainers have the educational training. However, it is not their job to provide nutritional counseling (Vinci, 1998). Topics reviewed will include: consumption of alcohol; disordered eating and eating disorders (further review on eating disorder risk assessment); frequency of eating; hydration; training and competition; and overall energy consumption.

Sports Nutrition and Alcohol Consumption

Alcohol is a calorie-dense compound that contains seven calories per ounce. The misuse of alcohol can affect the student-athlete in many ways by the following: canceling gains from a workout; causing dehydration; slowing the body's ability to heal; depleting one's source of energy; preventing muscle recovery; hampering memory and retention; inhibiting the ability to learn new information; constricting metabolism and endurance; requiring increased conditioning to maintain weight; and inhibiting the absorption of various nutrients (Firth, 2004).

When an athlete leaves high school and enters a college or university, a tremendous environmental transition takes place. A collegiate freshman has decreased adult supervision and greater personal freedom; thus, linking a statistically significant increase of alcohol consumption during the first year of college (Fromme et al., 2008). Despite being under direct supervision from their coaches, fellow team members, and the institution/school, student athletes remain more likely to engage in high-risk drinking and

to report getting drunk than the general college student population (Turrisi, Mastroleo, Mallett, Larimer & Kilmer, 2007). When comparing athletes to non-athletes, males were especially at high-risk for heavy drinking behaviors while non-athlete females reported a higher risk for heavy drinking behaviors. Off-season consumption was higher in both males and female athletes. It is of particular concern for coaches and athletic departments to be aware of this behavior shown in college athletes. Interventions with personalized feedback about physical consequences of drinking alcohol should be addressed to this high-risk college group (Yusko, Buckman, White & Pandina, 2008).

Disordered Eating (and Eating Behavior) Among Collegiate Athletes

Disordered eating is defined as being somewhat to extremely dissatisfied with one's body weight and engaging in at least one pathogenic weight control behavior within the past year (Beals & Hill, 2006). Female athletes may develop the Female Athlete Triad Syndrome, which includes three interrelated components of a serious nature: disordered eating, amenorrhea, and osteoporosis (Nattiv, Loucks, Manore, Sanborn, Sundgot-Borgen, & Warren, 2007). Female athletes may believe a lower body weight will enhance athletic success and begin to diet; energy restriction may cause pathogenic weight control behavior such as consciously controlling body weight for their sport (Beals & Hill, 2006).

Numerous studies have researched the prevalence of disordered eating, eating disorders (including anorexia nervosa and bulimia), and nutritional risk among collegiate athletes. The risk of disordered-eating behaviors is greater in females than in male athletes and in those sports that emphasize leanness or body image, such as gymnastics,

cross-country, and dance (particularly at higher levels of competition) (Reinking & Alexander, 2005; Beals & Hill, 2006; Quatromoni, 2008). Black, Larkin, Coster, Leverenz & Abood (2003) studied the prevalence rate of eating disorders among female athletes in 12 different sports at a Division I school. These authors found the highest prevalence rate of eating disorders among cheerleaders (33%). The only sports in which eating disorders were not observed were basketball and softball. In contrast, disordered eating occurred most frequently among gymnasts (50%), modern dancers (45%), and cross-country athletes (45%). One in three female collegiate athletes in this study reported experiencing some form of an eating disorder/disordered eating, supporting the existence of a serious health issue among female athletes (Black et al., 2003).

Beals & Hill reported 26 percent of female athletes at a Division I university reported menstrual dysfunction and 70 percent indicated their menstrual cycles were "irregular." Approximately one-third (32%) of the athletes in this sample demonstrated disordered eating behaviors.

Quatromoni (2008) reported a series of clinical observations from a sports dietitian who was an integral part of the multidisciplinary sports medicine wellness program that worked closely with collegiate athletics at a large Division I university. The dietitian's role was to identify, evaluate, and treat nutritional risks in college athletes. Eighty-two percent of those identified at risk for an eating disorder were women (18% of the cases were male) and 100 percent of those at the highest nutritional risk were freshmen or sophomores. This finding would indicate early intervention is essential because disordered eating can be prevented, particularly when treatment is initiated before unhealthy behaviors become habitual. Observations from this collegiate sports

medicine practice demonstrated that when nutrition services are provided, athletes will participate and even the hardest-to-reach individuals will benefit

A new eating behavior disorder, *orthorexia nervosa*, has been characterized by the pathological obsession for biologically pure food (excluding foods with herbicides, pesticides or artificial substances), which leads to important dietary restrictions and worrying about the techniques and materials used in the food industry. The diet becomes the most important part of one's life and these people may be vegetarians, raw food eaters, and/or those who consume mostly fruits. One reason an individual may decide to choose this pure food obsession is the desire to lose weight or perhaps spiritual reasons (Zamora, Bonaechea, Sanchez & Rial, 2005). There is little to no research of this behavior seen in collegiate athletes, but the prevalence in the overall population is estimated to be between one-half and one percent, with both genders equally affected.

There are an estimated 7.3 million Americans who consider themselves some type of vegetarian (Vegetarian Times, 2010). Vegetarian athletes need a well-planned diet to effectively support parameters that influence athletic performance since their diet is plant-based and fiber-rich. These athletes may be at risk for low intakes of energy, fat, vitamin B-12, riboflavin, vitamin D, calcium, iron, and zinc, many of which are readily available from the animal protein sources that vegetarians restrict. If an athlete suddenly decides to become a vegetarian to restrict their energy intake in an effort to attain a lean body composition, this may be a red flag for disordered eating (Rodriguez et al., 2009). Due to their close daily contact, coaches and teammates are often in a position to identify eating behavior changes that might signal disordered eating. Unfortunately, a recent study indicated only 38.3 percent of coaches reported their teams attended a program

about eating disorders. It is imperative for coaches and teams to be educated about signs, symptoms, and other issues related to eating disorders (Turk, Prentice, Chappell & Shields, 1999).

Eating Disorder Risk Assessment

Athletes with disordered eating or a diagnosed eating disorder may deny they have an issue or may not realize the problem exists. It is unlikely that an individual will come forward to obtain help with any delicate eating concerns, so it is often up to others to recognize the signs and symptoms of an eating disorder and spark an intervention. Numerous eating disorder questionnaires and screening instruments are available to help identify individuals who have disordered eating or those at risk. The Eating Attitudes Test 26 (EAT-26) is a shortened version of the EAT-40 assessment published by Garner and Garfinkle (1970). It contains 26 items that help identify thoughts, feelings, and behaviors associated with anorexia nervosa and eating disorder risk (Beals, 2006). This test has been used with high school students (male and female), exercisers (male and female), and female athletes (Austin, Ziyadeh, Forman, Prokop, Keliher & Jacobs, 2008; Lane, Lane & Matheson, 2004; Raymond-Barker, Petroczi & Quested, 2007). It has been suggested the EAT-26 would be an appropriate tool, in combination of education and preventative strategies, to administer among freshmen collegiate athletes to become more aware of eating disorder risk (Beals, 2006).

Frequency of Eating Among Collegiate Athletes

The nutritional demands of collegiate athletes are greater due to the expended energy during training and competition. For the busy athlete trying to juggle the

demands of school and sport, it is easy to skip meals, eat on the run, and limit hydration. Athletes coming from outside the United States, especially as freshmen, are often unfamiliar with food choices available. This unfamiliarity is also experienced amongst out-of-state athletes who are from different regions of the United States entering a new environment (Vinci, 1998).

In general, the amount of energy ingested appears to increase over the day with peaks during the lunch and dinner periods. Larger meal sizes over the day are accompanied by small amounts of time elapsing before the next meal, producing a decline in the satiety ratio. In simple terms, as intake increases throughout the day, the satiating effect of intake decreases. However, if intake in the morning is particularly satiating, then eating a large amount during the morning may reduce intake over the entire day (Castro, 2004). Murphy, Pagano, Nachmani, Sperling, Kane & Kleinman (1998) reported that eating breakfast increases a student's functioning on a broad range of psychosocial and academic measures. These discoveries are important for athletes because it is crucial for them to consume a nutrient dense breakfast as well as sport-enhancing snacks and meals throughout the day to sustain the physical and mental aspects of athletes' training and performance. Athletes should be encouraged to consume more frequent meals and distribute their energy intake between meals based on their daily activity schedules. Even small, frequent meals can prevent gastrointestinal consequences of a large meal, prevent overeating, and can safeguard fatigue (Ziegler, Jonnalagadda, Nelson, Lawrence & Baciak, 2002).

Hydration and the Collegiate Athlete

For optimal exercise performance, being well hydrated is a very important consideration. Dehydration (loss of > 2% of body weight) increases the risk of potentially life-threatening heat injuries, compromises exercise performance, and may impair mental/cognitive performance (Rodriguez et al., 2009). Every sport and all athletes should establish protocols for proper hydration since sport dynamics, environmental factors (extreme heat, cold temperatures, and high-altitude), acclimation states, exercise duration, exercise intensities, and individual preferences are factors related to hydration status (Casa, Armstrong, Hillman, Montain, Reiff, Rich, Roberts & Stone, 2000). For example, collegiate football players in preseason experience high 24-hour fluid-turnover and sweat rates which can contribute to a loss of total body mass. These football players (training group), at a large University, lost an average 3.4 liters of sweat and fluid per practice session. When multiple training sessions per day are combined with environmental heat stress, there is an increased need for fluid intake and taking breaks throughout practice can help prevent unnecessary fluid loss (Stofan, Osterberg, Horswill, Lacambra, Elchner, Anderson & Murray, 2007).

Before exercise takes place, athletes should be well hydrated (Casa et al., 2000). Volpe, Poule & Bland (2009) found that 66 percent of Division I collegiate athletes appeared to be hypo-hydrated (urine specific gravity of 1.020-1.029, dehydrated) prior to practice or training. Men had a greater prevalence of hypohydration than women athletes, even though men reported they, on average, drank more fluid than females (127 fluid ounces of water vs. 102 fluid ounces). This could be because males do not begin sweating until their core temperatures are higher and females have a higher

thermoregulatory threshold. Athletes can examine their own hydration status by self-evaluating urine color first thing in the morning. Even though this is something easy to evaluate, Volpe et al (2009) suggested athletes would benefit from more education about proper hydration and how to work around one's schedule to balance fluid loss and intake.

During moderate and high-intense exercise continued for 80 minutes or more (especially in the heat), it is suggested to drink a fluid solution of about 6.5 percent carbohydrate to delay fatigue. This has been documented in one particular study where six out of seven bikers were able to exercise longer with a carbohydrate fluid solution than the placebo group. The intervention group was able to bike an additional 14.5±4.9 percent longer, making their total ride an average of 145.6±15.1 minutes compared to the placebo's 123.1±13.4 minutes (Carter, Jeukendrup, Mundel & Jones, 2003).

The National Athletic Trainers' Association states the best indicator of hydration is an athletes' body weight changes during exercise since losing greater than 2 percent of body weight is considered dehydrated. However, some coaches may not set time aside for this so the athlete should drink fluids prior, during, and after practice, training, and competition. Ideally, optimal rehydration should occur 4 to 6 hours after the exercise and the athlete should drink 25-50 percent more than sweat losses to ensure adequate physiologic function (especially if there will be another exercise bout to follow). To conclude, collegiate athletes should be educated on how to monitor hydration status and be convinced to take responsibility for practicing hydration protocols such as monitoring body weight, taking note of urine color, and drinking sufficient fluids (Casa et al., 2000).

Nutrition for Training and Competition

Compared to the diet of the general population, collegiate athletes require additional fluid to cover sweat losses and additional energy (in calories) to fuel physical activity (Rodriguez et al., 2009). Eating prior to exercise and packing nutrient dense foods that could be consumed during training breaks can prevent fatigue and assist athletes with overall nutrient needs (Ziegler et al., 2002). Those competing in endurance sports benefit from a high carbohydrate diet prior to exercise (3-4 days prior to an event) to help maintain muscle glycogen and improve performance (Walker, Heigenhauser, Hultman & Spriet, 2000). Eating 200-300 grams of carbohydrate 3 to 4 hours before exercise is recommended by the American Dietetic Association to enhance performance. It should be recognized that many athletes do not like to compete on a full stomach so planning meals should be individualized as long as the athlete is ingesting enough to maintain hydration and prepare the athlete for the upcoming activity (Steinmuller et al., 2009).

The post-exercise regimen is extremely important for collegiate athletes (especially those who have another event within hours or day(s)). After endurance training such as running, athletes (male and female) should replenish glycogen losses by consuming carbohydrates as soon as possible. Post-exercise supplementation (i.e., CHO/Pro/Fat nutritional shake including 66% CHO, 23% Pro, and 11% Fat) may be especially important when an athlete: 1) trains or competes more than once per day, 2) exercises in the evening followed by a training the next morning, and 3) is unable to consume high carbohydrates over the next 24 hours (Tarnopolsky, Bosman, MacDonald, Vandeputte, Martin & Roy, 1997).

After resistance exercise, a collegiate athlete may include not only carbohydrates but protein as well to result in positive muscle protein balance (Tipton, Ferrando, Phillips, Doyle & Wolfe, 1999). In fact, it is now concluded consuming 16 ounces of low-fat chocolate milk after post-exercise is an effective alternative to commercial fluid-recovery (CF) and carbohydrate replacement (CR) drinks from exhausting, glycogen-depleting exercise. Those who drank chocolate milk compared to the CF or CR drinks were able to exercise longer until the time of exhaustion (Karp, Johnston, Tecklenburg, Mickleborough, Fly, & Stager, 2006). This is a wonderful discovery since chocolate milk is easily accessible in grocery stores and college campuses. Low-fat chocolate milk contains the following macro- and micronutrients: ~62% carbohydrate, ~21% protein, ~17% fat, ~90% water, calcium, potassium, phosphorus, vitamin A, vitamin D, vitamin B12, riboflavin, and niacin (National Dairy Council, 2009). With this significant study, along with the other information relayed, collegiate athletes should be advised to figure out what works best for them by experimenting with new foods, beverages, and planning ahead to ensure they are meeting their needs for training and competition (Steinmuller et al., 2009).

Overall Energy Consumption

As energy requirements increase, athletes should first aim to consume the maximum number of servings appropriate for their needs from carbohydrate-based food groups (e.g., bread, cereals, pastas, whole grains, legumes, milk/alternatives, vegetables, and fruit). Energy needs for many athletes will exceed the amount of calories/day in the highest range of servings for the various food groups. However, if one is a smaller

athlete, greater attention of food choices should be advised since their energy needs are lower (Rodriguez et al., 2009).

Hinton, Sanford, Davidson, Yakushko & Beck (2004) found a disparity between the recommended caloric intake and actual intake for both male and female collegiate athletes. These authors found the average recommended energy intake for male collegiate athletes was 2900 calories, but they consumed, on average, only 2447±1053 calories; the average recommended caloric intake for women was 2200 caloric intake, but they consumed 2141±781 calories. The authors suggest collegiate athletes would benefit from learning about the importance of obtaining adequate dietary energy in the form of carbohydrates, protein, and fats to achieve optimal athletic performance and ways to meet daily recommendations.

Individuals working with college athletes may need to provide them with tips for preparing small, quick to fix meals that can be consumed on the run, which will meet their energy needs during training and performance while on a busy schedule (Ziegler et al., 2002).

Collegiate Athlete Nutrition Knowledge and Sources of Information

Dietary macronutrient guidelines recommended for athletes should be individualized when examining the physical state of the athlete, but, in general, most professional health organizations recommend that 55-60 percent of an athlete's calories should come from carbohydrates, 12-15 percent from protein, and 25-30 percent from fat (Dunford, 2006). The general population's daily macronutrient recommendation ranges currently are 45-65 percent carbohydrates, protein 10-35 percent, and fat 20-35 percent

(U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2005). Athletes should not consume a diet containing less than 15 percent fat, as fat is essential for good health (Rodriguez et al., 2009).

Collegiate athletes participating in a Division I sport should be encouraged to value, seek, and participate in nutritional services that guide healthful eating and healthful weight control. However, not every athletic program has the opportunity to take advantage of a sports dietitian. A close collaboration with the coaches, athletic trainers, and sports medicine colleagues is needed to identify recognize nutritional risks among student-athletes (Quatromoni, 2008).

Several studies have been conducted to determine the nutritional knowledge of collegiate athletes. Jacobson, Sobonya, & Ransone (2001) examined the nutritional knowledge of athletes representing 16 universities from a wide variety of sports including football, baseball, women's track and field, men's track and field, women's swimming, wrestling, men's volleyball, women's tennis, women's basketball, softball, soccer, crew, and golf. Only 3.0, 11.7, and 29.5% correctly identified the recommended percent of total calorie intake for protein, fat, and carbohydrates, respectively. Only 37 percent of the athletes could identify the role of vitamins, while slightly more than half (54.4%) could identify the role of dietary protein. Almost one in five (18.1%) of the men in this sample incorrectly believed vitamins aided in weight gain and 29.9 percent of the men thought vitamins provided immediate energy. Nearly half of the respondents thought fat should make up less than 12 percent of one's total calories. Two-thirds (66%) of the respondents reported that protein should make up 26 percent or more of the diet and 39 percent thought 40 percent less of total calories should come from carbohydrate.

Hornstrom, Friesen, Ellery & Pike (2011) found a significant relationship ($r = -0.23$; $p = 0.002$) between collegiate the softball players' nutrition knowledge score (NKS) and the quality of their food selections, with the lower the players' nutrition knowledge the poorer their eating habits. A significant relationship was found between the players' nutrition knowledge and their nutrition practices ($r = 0.23$; $p = 0.002$), with the higher the individual's nutrition knowledge, the closer their nutrition practices were to fulfilling the USDA Food Guide Pyramid recommended daily servings). Lastly, a significant relationship was found between the players' nutrition knowledge score and their attitude toward a sport-enhancing diet score ($r = -0.17$; $p = 0.02$), with the higher a subject's NKS, the more positive (i.e., lower score) was their attitude toward a sport-enhancing diet (e.g., eating a sport-enhancing diet will help me to be a more successful softball player). These results suggest taking steps to enhance an athlete's nutrition knowledge can have a positive impact on their dietary intake.

Jacobsen et al., (2001) reported that female collegiate athletes (60.6%) were more likely to seek nutritional information than were male athletes (49.5%). The primary nutritional sources for these collegiate athletes included the strength and conditioning coach, athletic trainer, team coach, or magazines. The authors suggest sport coaches should be required to have a nutrition background if they insist on distributing nutritional information, especially for the schools that do not have a sport dietitian readily available.

Rockwell, Nickols-Richardson, & Thye (2001) surveyed 35 coaches and 18 athletic trainers representing Division I colleges to determine their nutrition knowledge. The coaches and trainers responded correctly to 67 percent of the nutrition knowledge questions on the survey. Fifteen percent of the respondents indicated they instructed

athletes to "go on a diet." If the program had access to a dietitian, 100 percent of the coaches and athletic trainers used them for nutritional information. The authors concluded that nutrition professionals and psychologists were underutilized, especially when dealing with disordered eating among athletes and they encouraged athletic departments to hire a dietitian or allow dietitians to consult and/or train coaches, trainers, and other staff members to benefit the collegiate athlete and sports teams.

Nutrition Interventions among Athletes

It has been stated that the transition from high school to college is not only a lifestyle change for freshmen college students, but the collegiate athlete has additional nutritional needs exceeding the general population (Rodriguez et al., 2009). Freshmen are at a greater nutritional risk coming into a collegiate program (Quatromoni, 2008), but when given the opportunity, athletes benefit from nutritional intervention programs and individual guidance. For example, The University of Washington has incorporated a nutrition support team for their athletes. These individuals have experienced personal successes like competing in the 1996 Summer Olympic Games (Vinci, 1998).

When Division I women's sports team participated in a nutrition education intervention, athletes demonstrated more confidence in their ability to make healthier choices. These women also increased nutrition knowledge as well as a significant overall difference in the number of positive dietary changes over a controlled group who did not experience the nutritional education intervention (Abood et al., 2004). Baer, Walker, & Grossman (1995) incorporated an assessment and education intervention for college athletes at risk for disordered eating was well received by participants. The intervention

team included a dietitian who monitored the nutritional status, eating patterns, and educated the student athletes. The nutrition seminars helped improve the knowledge of the athletes at disordered eating risk. In addition, 100 percent of the participants attending the education indicated they liked the format of meeting with the various professionals on the intervention team.

The Athletes Targeting Healthy Exercise and Nutrition Alternatives Program, ATHENA, was a school-based and sport team-centered curriculum developed to prevent substance use and disordered eating (Elliot, Goldberg, Moe, DeFrancesco, Durham, McGinnis, & Lockwood , 2004). The intervention involved high school athletes attending eight, weekly education sessions that focused on the following: healthy sport nutrition, effective exercise training, drug use, and other unhealthy behaviors' effects on sport performance, media images of females, and depression prevention. Participants, mean age of 15 years, reported significant decrease in weight-loss pill usage, healthier eating behaviors, reduction in those vomiting to lose weight, decrease in those using muscle-building supplements, and positive changes in strength-training self-efficacy. The ATHENA program concluded sports teams are effective and natural vehicles to promote healthy behaviors and prevent disordered eating/other health-harming behaviors (Elliot, Goldberg, Moe, DeFrancesco, Durham, McGinnis, & Lockwood, 2004)

Due to lack of research and/or studies in relation to anticipatory guidance ("heads up" advice) and collegiate athletes, the question remains if anticipatory guidance is an effective approach to identify appropriate nutrition education needs and increase nutrition knowledge for freshmen and sophomore collegiate athletes.

Summary

The theory of anticipatory guidance has been recognized as effective preventative education among various areas of health care. This type of guidance offers individualized advice to avert risky behavior patterns and promote healthy lifestyle choices. As underclassmen collegiate athletes adapt to a new environment, optimal nutrition is crucial for physical activity, athletic performance, recovery from exercise, and overall health. It is important for freshmen and sophomore athletes, as well as their teammates, coaches, and athletic departments, become aware and educated of potential nutritional concerns and issues that may arise during their collegiate career. One of the risky health issues, disordered eating, is a problem among college athletes. The EAT-26 assessment tool would be appropriate to help identify eating disorder risk. By utilizing the theory of anticipatory guidance among underclassmen collegiate athletes the following may be by-products: 1) identification of nutritional education needs; 2) preventing health and nutrition related problems before they occur; and 3) intervention to collectively grow the nutrition knowledge and attitudes among this specific population.

CHAPTER III

METHODS

The purpose of this mixed-methods, quasi-experimental study was to assess the eating disorder risk and nutrition knowledge of freshmen and sophomore Division I collegiate athletes at a Midwestern university and to determine the viability of using the theory of anticipatory guidance to identify the athletes' nutrition education needs related to alcohol consumption, disordered eating and eating disorders, frequency of eating, hydration, training and competition nutrition, and overall energy consumption. The methods used to implement the study will be presented in this chapter.

Institutional Review Board Approval

The study, including all data collection instruments, letters, methods, and lessons, was approved by the University Institutional Review Board as an expedited study (Appendix A-1). The researcher completed the CITI training to satisfy the institutional instructional mandates in the protection of human research subjects. (Appendix A-2).

Population

The potential population for this quasi-experimental study included 230 freshmen (n=120) and sophomore (n=110) collegiate athletes from the 17 NCAA-sanctioned sports

teams (e.g., baseball, men's and women's basketball, women's cross country/track, women's field hockey, football, men's and women's golf, gymnastics, women's soccer, softball, men's and women's swimming/diving, men's and women's tennis, and men's and women's volleyball) who were enrolled at a Midwestern university during the 2009-10 and 2010-11 competitive seasons. Of these, 101 were male and 129 were female. Only freshmen and sophomore athletes 18 years of age or older were included in this study.

Survey Instruments

The pre-assessment instruments used in this study included the Eating Attitudes Test 26 (EAT-26) (Garner, Olmstead, Bohr, & Garfinkel, 1982) (Appendix D-1) and the Sports Nutrition Knowledge Questionnaire (SNQ) (Appendix D-2), based on the questionnaire used by Hornstrom (2007). The post-assessment instruments included the Sports Nutrition Knowledge Questionnaire without the five Attitude Toward a Sport-Enhancing Diet questions and the Anticipatory Guidance Survey (Appendix D-3).

EAT-26 Screening Tool

The EAT-26 (Appendix D-1) is a validated eating disorder screening tool (Garner et al., 1982; Lane, et al, 2004; Austin et al., 2008) that contains 26 items and produces scores that range from 0 to 78. The authors of EAT-26 have given permission for individuals, health professionals, school counselors, coaches, camp counselors, and others to use the survey (Garner et al., 1982). A summed score is obtained for each participant based on their response to each of the 26 questions, where a response of "never," "rarely," and "sometimes" is scored as "0," "often" is scored as "1," "very

often" is scored as "2," and "always" is scored as "3." A total score of 20 and above on this screening tool indicates the individual may have a possible eating disorder and should be evaluated further.

Sport Nutrition Questionnaire

The Sport Nutrition Questionnaire (SNQ) (Appendix D-2) was adapted from the 80-question instrument used by Hornstrom (2007). Twenty of Hornstrom's 80 questions specific to the sport nutrition anticipatory guidance presentation were selected for use in this study. To assist in the validation of the abbreviated 20-question SNQ Questionnaire, students in a freshman-level introductory class in Family and Consumer Sciences were given the opportunity to take the test as one of many extra credit opportunities; none of the class members were student-athletes. Based on their results, two questions correctly answered by the majority of the students were replaced. Content and face validity of the final 20-question SNQ was established by three registered dietitians. The 20 questions were answered by selecting "True," "False," or "Don't Know." Each correct answer received a score of "1" and each incorrect answer received a score of "0." The score for each of the 20 questions was summed to receive a SNQ total score. The scores for the SNQ ranged from a low of 0 to a high of 20, with a score of 14 or higher (e.g., 70% or higher) considered a "passing" score. Five questions from Hornstrom's (2007) Attitude Toward a Sport-Enhancing Diet section were included on the pre-test version of the Sports Nutrition Questionnaire (Appendix D-2). The participants' responses toward each attitude question/item varied from strongly to strongly disagree.

Anticipatory Guidance Survey

The Anticipatory Guidance Survey (AGS) (Appendix D-3), developed by this researcher, was modeled after previously published surveys that explored the impact of anticipatory guidance in a variety pediatric and adult populations (Schuster et al., 2000; Warkentin et al., 2008; Woolford et al., 2007; Yamokoski et al., 2008). Two Registered Dietitians and a researcher specializing in sport psychology reviewed the AGS for face and content validity. The Anticipatory Guidance Survey used open-ended questions to: 1) explore the feelings and attitudes of the freshman and sophomore athletes toward receiving additional information about sports nutrition topics, 2) identify previously-used sources of nutrition information, 3) measure the athletes' comfort level with requesting nutrition information or advice from coaches, athletic trainers, and dietitians, 4) identify additional nutrition concerns related to sport performance and health, 5) explore the athletes' attitude about the perceived value of receiving additional "heads up" nutrition advice, and 6) identify specific nutrition-related behavior changes the athlete anticipated making as a result of attending the nutrition education presentation.

Anticipatory Guidance Nutrition Education Presentation

An 83 slide PowerPoint nutrition education presentation (Appendix E) was developed by this researcher, a former Division I athlete and soccer player (2004-2008) who holds a bachelor's degree in Exercise Science (2008) who is currently completing her Master's of Science degree in Dietetics. This researcher also served as an assistant coach for a Division I men's and women's golf teams for two years. The six key concepts included in the presentation (e.g., consumption of alcohol, disordered eating,

frequency of eating, hydration, training and competition, and overall energy consumption) were selected based on this researcher's personal experience and observations as a student-athlete and a graduate assistant coach. The nutrition content included in the presentation was derived from materials provided from Kimberly L. Pike, Registered Dietitian, Certified Sports Dietitian and Instructor; Sports Nutrition To Go, Sports Nutrition facility in Cincinnati, Ohio (Sports Nutrition To Go, 2004-2010), the American Dietetic Association's Sports and Cardiovascular, Wellness and Nutrition (SCAN) website, and peer-reviewed journal articles. Take-home handouts given to the athletes were obtained from the American Dietetic Association/SCAN website (www.eatright.org) and donated by the University Counseling Center. Each of the six topics was discussed for approximately 15 minutes. The researcher kept a journal where questions and comments made by the athletes were noted and field notes were recorded.

Procedures

Prior to conducting the study, permission to allow the athletes to participate was obtained from several individuals. The actual letters are not included in the Appendices to protect the confidentiality of the athletes. In addition, all other pieces included in the Appendices have been de-identified.

An Associate Athletic Director at the selected university was contacted to obtain permission to conduct the study. Upon obtaining permission, a second Associate Athletic Director was contacted to obtain a room on campus for one nutrition presentation lasting two hours on Tuesday, October 26, 2010 from 7:00 pm- 9:00 pm. Following confirmation of the study's location, each of the 17 head coaches was personally handed

a letter inviting their freshmen and sophomore athletes to participate in the study. If the head coach was busy, the letter was given to an assistant coach or personal secretary. A list of freshmen and sophomore athletes on each team, obtained from the sports rosters located on the University's website, was included in the coach's information. The coach was asked to confirm the accuracy of the list, make any additions or corrections as necessary, and place the signed letter to their administrative assistant or hand back to the researcher.

Subsequently, the researcher personally invited each underclassman athlete to the study through campus email (Appendix B-1). The athletes were asked to commit to the study by emailing the researcher back. One follow-up reminder was sent to re-state the time and location of the nutrition presentation. With permission from the strength and conditioning coach, the researcher posted a flyer in the Varsity Weight Room (Appendix B-2) as an additional recruitment tool.

Due to athletic competition conflicts and in-season schedule, the goal of obtaining 50-75 athletes to participate in the study was not met after the first presentation and a second presentation was planned. A room holding up to 75 students was reserved in the University Library by the researcher's thesis advisor. The same protocol to recruit the subjects was followed with the exception of contacting the head coaches.

The letter of consent informing athletes about the purpose, discomforts, and benefits of the study was given to each athlete immediately prior to the nutrition presentation (Appendix C-1). The letter of consent included informed athletes about the University's Counseling Center due to the sensitive nature of the Eating Attitudes Test (EAT-26). The Counseling Center was made aware of the presentations to ensure a

seamless experience if an athlete contacted the Counseling Center following the presentation.

The first presentation with the student-athletes was held in an athletic arena lounge on campus on Tuesday, October 26, 2010 from 7:00 pm-9:00 pm. The second presentation took place in the University Library on November 18, 2010 from 7:30 pm-9:30 pm. Healthy snacks were provided by the researcher during both sessions.

The pre-assessment instruments (e.g., the EAT-26 and a brief Sport Nutrition Knowledge Questionnaire) were given at the beginning of the presentation (Appendix D-1 and D-2). The athletes did not include their names on any form; the athletes were identified by a numeric code that included their birth date plus the last four digits of their cell phone number. For example, if an athlete was born on October 25 and the last four digits of their cell phone were 4556, their identifiable code was "254556." The researcher collected the completed pre-assessment surveys and placed them in a folder labeled "Freshmen Pre-Test" or "Sophomore Pre-Test."

After collecting the pre-test information, this researcher gave the sports nutrition presentation. After the presentation was completed, the athletes were given the post-assessment that contained the qualitative Anticipatory Guidance Questionnaire (D-3) and the Sport Nutrition Knowledge Questionnaire (SNQ; Appendix D-2). It took the athletes approximately 15-20 minutes to complete both post-assessment instruments. The researcher collected the surveys at the end of the hour and placed them in appropriate folders (e.g., Freshman Post-Test" or "Sophomore Post-Test). Subsequently, the researcher matched the pre-assessment survey instruments to the post-assessments for data entry purposes.

Control Group

To ensure any observable gains in nutrition education in the treatment group between the pre-test and post-test on the SNQ occurred as a result of the Sports Nutrition presentation and not by chance, a control group comprised of members of University-sponsored club sports teams was solicited. Initially, this researcher gave a ten-minute informational presentation describing the research study during a meeting of representatives from each club sport team. This researcher explained that the club athletes would be asked to complete the 20 question Sports Nutrition Questionnaire, listen to a one-hour presentation entitled "The Psychological Impact on Peak Performance" given by two graduate students majoring in Sport Psychology, and then re-take the SNQ questionnaire. Those club sport representatives who thought their team members would be willing to attend the sports psychology lecture and participate in this study signed a letter of invitation. Subsequently, this researcher emailed the interested club sport athletes inviting them to attend the presentation in the Student Wellness Center on Wednesday, November 3, 2010.

Prior to the presentation, the researcher distributed a consent form (Appendix C-1) and the 20-question Sports Nutrition Knowledge questionnaire to all participants. The athletes were asked to place their birth date and the last four digits of their cell phone on the SNQ. The consent forms and the coded SNQs were collected and placed in an envelope marked "Control Group: Pre-Test". The SNQ post-assessment was re-distributed after the sports psychology presentation and once again the participants were asked to place their birth date and the last four digits of their cell phone on the post-instrument so surveys could be matched. The numerically coded post-assessment SNQs

were collected and placed in an envelope marked "Control Group: Post-Test." The instrument took the control group approximately 10 minutes to complete.

Data Analysis

All quantitative data was entered into an Excel spreadsheet and uploaded into SPSS 17.0 software (SPSS, 2010) for data analysis. Statistical techniques applied included descriptive information (e.g., frequencies, percentages, means, standard deviations), paired t-test, and analysis of variance (ANOVA) tests. A total nutrition knowledge score and six nutrition knowledge sub-scores (i.e., the sum of the correct number of responses for questions associated with each construct) were calculated. The sub-scores were grouped in relation to the topics discussed during the presentation (e.g., consumption of alcohol). The total Sport Nutrition Knowledge score and the sub-scores from the post-assessment were compared to the subjects' answers prior to the anticipatory guidance. Interpreting the responses helped answer the question if anticipatory guidance was an effective way to identify nutritional education topics as well as a way to intervene to change sport nutrition knowledge and attitudes for freshmen and sophomore collegiate athletes. Difference between groups was determined using ANOVA and paired t-tests. The level of statistical significance for all tests was $p \leq 0.05$.

All qualitative data collected on the Anticipatory Guidance Survey (e.g., participants' attitudes) was compiled into one document and organized by survey question. The qualitative data was initially sorted and analyzed using inductive reasoning. The individual responses for each survey question were examined to build a better understanding of the larger picture. After the data for each question was entered

into it's own unique table, the researcher examined the responses, highlighting them for themes and trends (e.g., individual comment of "Eating a sport enhancing diet will help me be a more successful college athlete") using the content analysis approach based on the procedures of Cote, Salmela, Baria, and Russel (2003). Participants' responses were classified into two groups according to their level of interest of receiving additional nutrition information based on the elaborated responses of the Anticipatory Guidance Survey. The responses were distributed into either "Very Interested" or "Not Very Interested/Neutral" in receiving additional information; opening coding was then completed to examine distinct themes and separate segments. Open coding allowed the researcher to further categorized and subcategorized responses by taking the large set of responses and reduce them to a manageable form. Core categorizes were then identified based on the themes and trends (e.g., "weight gain" and "weight loss") suggested by the athletes (e.g., Weight Management). In order to organize elaborated responses, topics identified were coded by the following: alcohol consumption, AC; disordered eating, DE; frequency of eating, FE; hydration, H; training and competition, TC; and overall energy consumption, OEC as these were the topics presented by the researcher during the AG intervention.

The researcher analyzed and categorized the written responses via inductive reasoning and created visual aids via deductive reasoning. Two additional researchers reviewed the survey responses to triangulate the data.

CHAPTER IV

RESULTS

The purpose of this mixed-methods, quasi-experimental study was to assess the eating disorder risk and nutrition knowledge of freshmen and sophomore Division I collegiate athletes at a Midwestern university and to determine the viability of using the theory of anticipatory guidance to identify the athletes nutrition education needs related to alcohol consumption, disordered eating and eating disorders, frequency of eating, hydration, training and competition nutrition, and overall energy consumption. Results of the study are presented in this chapter.

Participants

In the fall of 2010, seventeen Division-I collegiate sport teams and thirty-three club sport teams were invited to participate as the experimental and control groups in this study, respectively. A total of 71 participants were involved in the study (Treatment Group = 40; Control Group = 31). All participants were 18 years of age or older. A description of the participants follows.

Treatment Group

Sixteen (94%) of the seventeen Division I coaches agreed to encourage their freshmen and sophomore athletes to participate in this study. At the completion of the

study, over half of the teams (n=9; 53%) had at least one athlete participant in the study. According to team rosters, in the fall of 2010, 230 freshmen and sophomore Division I athletes were listed. Of these athletes, 40 (17%) underclassmen athletes completed all survey instruments provided during the sport nutrition presentations. Of the 40 athletes, 21 (52.5%) were male and 19 (47.5%) were female; 24 (60%) of the participants were freshmen and 16 (40%) were sophomores during the fall of 2010. By sport, of the 40 treatment group participants, 12 (30%) played football, 11 (27.5%) played women's soccer, five (12.5%) played men's volleyball, three (7.5%) participated in women's gymnastics, three (7.5%) played men's golf, three (7.5%) played women's golf, one (2.5%) was a female swimmer, one (2.5%) ran women's cross country, and one (2.5%) played men's baseball (Table 1).

Control Group

According to the Director of Club Team Services, there were 33 active club sports teams in the fall of 2010 and an estimated 1,150 club athletes. Of these, 31 (3%) club team members participated in this study as the control group for the quantitative portion of this study, completing both Pre-Intervention-Sport Nutrition Questionnaire and Post-Intervention-Sport Nutrition Questionnaire. The club sport athletes did not complete the EAT-26 or Anticipatory Guidance Survey.

By gender, 29 (94%) club team members were female and two (6%) were male. The club athlete participants ranged in class standing from freshmen to graduate student, with 13 (42%) freshmen, 4 (13%) sophomores, 6 (19%) juniors, 7 (23%) seniors, and 1 (3%) graduate student. By sport, 19 (61%) of the club athletes were women's rugby

players, eight (26%) were female synchronized swimmers, three (10%) were triathlon members (2 male; 1 female), and one (3%) was a female runner (Table 1).

Table 1. Characteristics of the Control and Treatment Groups (n=71).

	Treatment Group N=40		Control Group N=31	
Gender	N	Percent	N	Percent
Male	21	52.5%	2	6.5%
Female	19	47.5%	29	93.4%
Total	40	100%	31	100%
Class Standing				
Freshman	24	60.0%	13	41.9%
Sophomore	16	40.0%	4	12.9 %
Junior		-	6	19.4%
Senior		-	7	22.6%
Graduate		-	1	3.2%
Sport				
Football	12	30.0%		-
Women's soccer	11	27.5%		-
Men's volleyball	5	12.5%		-
Women's gymnastics	3	7.5%		-
Men's golf	3	7.5%		-
Women's golf	1	2.5%		-
Female swimmer	1	2.5%		-
Women's Cross Country	1	2.5%		-
Baseball		-		-
Women's Rugby		-	19	61.3%
Synchronized swimmers		-	8	25.8%
Triathlon members		-	3	9.7%
Female runner		-	1	3.2%

RQ#1: Anticipatory Guidance and Nutrition Education

Research question #1 examined the effectiveness, appropriateness, and need for anticipatory guidance among underclass athletes; anticipated behavior changes; and the athletes primary sources of nutrition information. The Anticipatory Guidance (AG)

Questionnaire contained two open-ended questions and six Likert-scale questions that related to the content of the presentation and the athletes' anticipated additional educational needs. The Likert scale options included: "Not at all interested," "Not very interested," "Neutral," "Somewhat interested," and "Very interested." Participants who responded they were "Very interested" or "Not at all interested" in receiving additional information about certain topics were asked to explain their specific needs. Participants could elaborate even if they did not respond with "Very interested" or "Not at all interested."

Results indicated underclass athletes desire the need for more nutrition information and advice. As seen in Table 2, freshmen and sophomores were very interested in receiving nutrition education regarding anticipatory guidance topics presented. When the options "Somewhat Interested" and "Very Interested" were combined, additional information about alcohol continued was the topic of greatest interest (82.5%). When the options "Neutral," "Not Very Interested," and "Not At All Interested in receiving additional information were combined, the topic of least interest was "Overall Energy Consumption" (93.4%).

Table 2. Nutrition Education Needs Among Underclass Collegiate Athletes (n=40).

Topic Presented	Somewhat Interested and Very Interested		Neutral, Not very interested, Not at all interested	
	N	Percent	N	Percent
Alcohol Consumption	33	82.5%	7	17.5%
Eating Behaviors	24	60.0%	16	20.0%
Frequency & Timing of Eating	25	62.5%	15	37.5%
Hydration	21	52.5%	19	47.5%
Training & Competition Diet	30	75.0%	10	25.0%
Overall Energy Consumption	5	6.6%	35	93.4%

Despite not selecting "Very interested" or "Not at all interested," several athletes provided their thoughts related to the first six items on the Anticipatory Guidance Questionnaire, with the athletes elaborating the most about Overall Energy Consumption (n=13; 65%), Frequency of Eating (n=6; 30%), and Training/Competition (n=8; 40%). Alcohol Consumption was the most common core topic about which participants elaborated further about why they were "Not at all interested," "Not very interested," or "Neutral" about receiving additional information. Five (12.5%) of the 40 participants indicated they did not drink alcohol and did not desire information on this topic.

The flow of the participants' responses, from both a Negative/Neutral and a Positive perspective, is presented in Figures 1 and 2. The flow was constructed by analyzing the responses through deductive reasoning. Half the participants (n=20) further explained their reason why or why not they were "Very interested" (95% of 20) or "Not very interested" (5% of 20) in receiving additional nutritional information (i.e., "How many calories I need to lose weight in a healthy way").

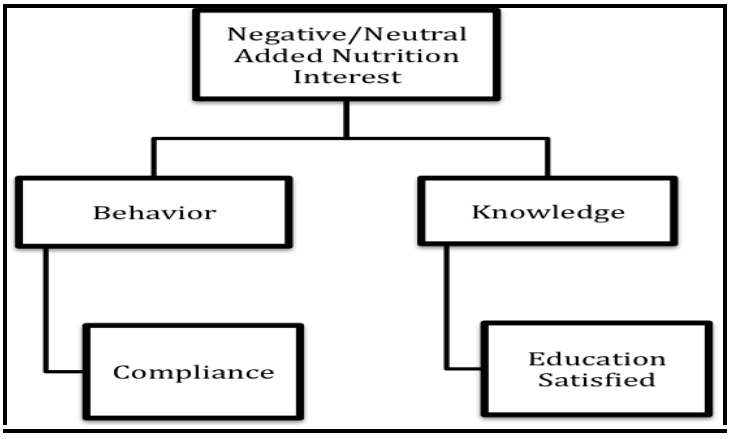

Figure 1. Anticipatory Guidance Related to Nutrition Education Needs of Division I Collegiate Athletes: Negative/Neutral Added Nutrition Interest (n=40).

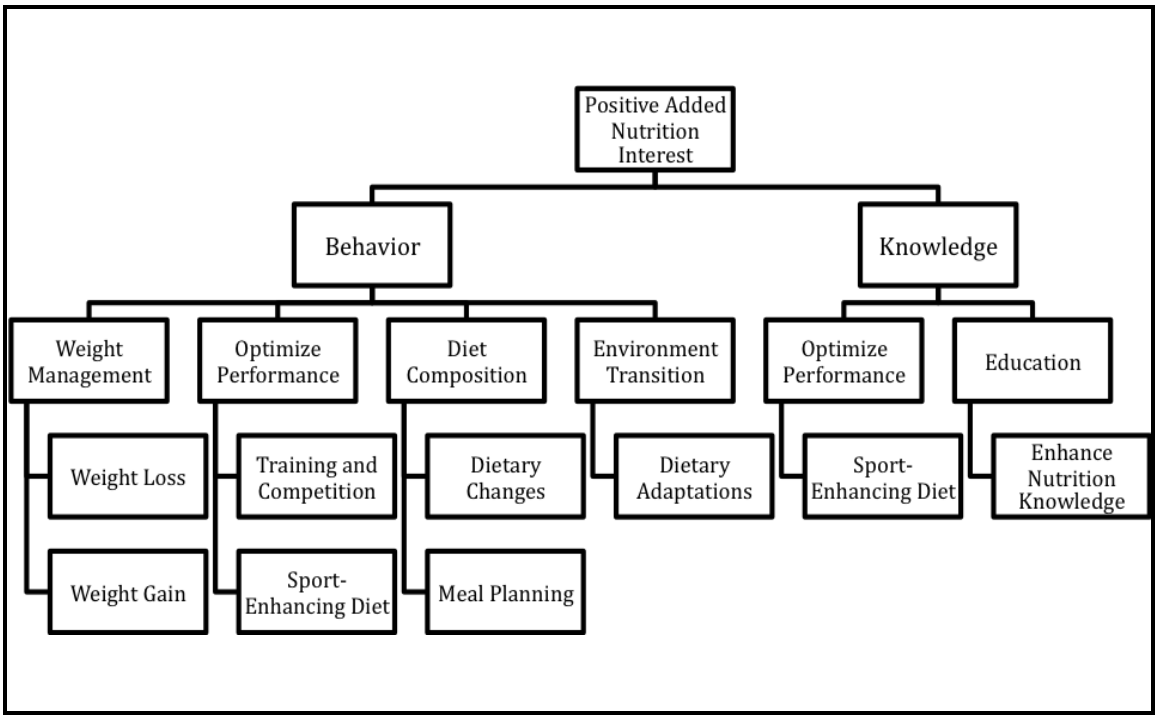

Figure 2. Anticipatory Guidance Related to Nutrition Education Needs of Division I Collegiate Athletes: Positive Added Nutrition Interest.

Two-opened ended questions asked the athletes "What other nutrition guidance or nutrition concerns do you feel would be beneficial to learn in order to increase sport performance and overall health?" and "If you were to receive more nutritional "heads up"/preventative advice based upon your recent transition into college, do you believe it would help your future athletic career? Please explain your answer." The athletes indicated they had a variety of additional nutrition education needs, many of which related to personal interest. One participant desired information pertaining to "examples of dorm food available in dining halls b/c teams eat together there before games" while another athlete wanted to know "How many calories I need to gain weight until at desired weight." The most common nutrition education needs other than the six topics presented, identified as core categories, were those pertaining to Meal Planning (e.g., meal ideas that

meet nutrient needs), Weight Management (e.g., calories needed to gain weight), Food Specific Information (e.g., ingredients to look for on a food product), and Optimizing Performance (e.g., Sport-Specific information).

Perceived Benefit of Anticipatory Guidance

Almost all of the athletes (n=38, 95%) receiving the nutrition intervention expressed anticipatory guidance as a useful educational tool for their future. One participant stated: "Yes, diet is extremely important especially when transitioning to a new environment. I feel it would be helpful for everyone." The quotes from the open-ended questions were included in the open coding analysis to provide the researcher additional information about the nutrition education needs of underclassmen athletes.

Participants were asked if anticipatory guidance would be beneficial for their future career as a Division I athlete. The participants were also asked to further explain their answer. According to the respondents, 98 percent (n=38) believed if they were given nutritional "heads up" advice to help cope with their transition to college it would help their future athletic career. Individual responses are shown in Table 3. These responses were used to develop Figures 1 and 2 above.

Table 3. Perceived Benefit of Anticipatory Guidance: Individual Reponses (n=40).

Responses by Select Athletes
"Yes, I would know what to expect."
"Yes, it is a big change from home to the dorms."
"Yes, getting started on the right foot would definitely help."
"Yes, I would have planned a healthier diet earlier."
"Yes, if I started now by my Jr. and Sr. year I would be performing at my best."
"Definitely, if I was given a structured advice and help planning a suitable diet I would follow it and believe it would help my performance."

Anticipated Behavior Changes

Participants who received the AG nutrition intervention were asked to identify "how they planned to change their eating and/or behavioral habits" based on the information provided. Athletes could choose from 16 behavior changes. Over three-more fruits and vegetables each week (70%), and consume a recovery snack within 30 minutes after practice or lifting (67.5%). Reading nutrition labels (45%) and choosing healthy options on travel trips (45%) were the behaviors least likely to be made.

Table 4 Percent of Freshmen and Sophomore Athletes who Anticipated Making Changes in their Personal Eating Habits (n=40).

Personal Eating Habit	Percent
Eat breakfast every morning.	77.5
Bring water bottle to class.	75.0
Eat more fruits and vegetables weekly.	70.0
Consume a recovery snack within 30 minutes after practice or lifting	67.5
Eat something before early morning workouts.	65.0
Eat a pre-game meal 3-4 hours before competition.	60.0
Pack healthy snacks during the day.	60.0
Try to incorporate new sources of lean protein into the diet (e.g., beans).	57.5
Increase meal planning.	57.5
Eat more throughout the day.	55.0
Avoid too much saturated fats and trans fats.	55.0
Increase consumption of fish weekly.	47.5
Recommend others/teammates to wait to consume alcohol until age 21.	47.5
Recommend others or teammates to limit alcohol consumption.	47.5
Limit caffeine.	47.5
Read nutrition labels.	45.0
Choose healthy options on travel trips.	45.0

Participants could identify other nutritional changes not listed in that particular questionnaire item. Eight athletes listed additional information. Changes such as "drink more water and eat less chocolate muffins" and "eat 1 veggie and 1 fruit with a meal" were two personal changes after attending the AG nutrition intervention.

Sources of Nutrition Information

Participants were asked to identify from whom or where they received nutrition information prior to the presentation. The athletes could identify as many resources as pertained to them. The two most common sources of nutrition information among these undergraduate DI athletes were the sport and conditioning coach (77.5%) and the athletic trainer (70%); a dietitian/nutritional professional was cited by the athletes as the least used source of nutrition information (30%)(Table 5).

Table 5. Athlete's Sources of Receiving Nutrition Information Prior to the Nutrition Presentation (n=40).

Source of Nutrition Information	Treatment Group Percent (N)
Sport and Conditioning Coach	77.5% (31)
Athletic Trainer	70% (28)
Classes	60% (24)
Parents	50% (20)
Internet	45% (18)
Head Coach	40% (16)
Friends	40% (16)
Magazines	37.5% (15)
Assistant Coach	32.5% (13)
Dietitians/Nutrition Professionals	30% (12)

Level of Comfort Approaching Professionals about Nutrition

The collegiate athletes were asked to identify their level of comfort if they were to approach various professionals (e.g., head coach, assistant coach, strength and conditioning coach, athletic trainer, and a registered dietitian) about/requesting nutrition information. Responses on the Likert scale ranged from a score of 1, meaning "not comfortable at all", to a score of 5, meaning "very comfortable." The highest mean score of 4.58 ± 0.84 was obtained for approaching a registered dietitian, while the lowest mean of 3.10 ± 1.52 was obtained for approaching a head coach (Table 6). Seventy-five percent of the athletes (n=30) expressed they would feel "very comfortable" approaching a registered dietitian for nutrition information and 70 percent (n=28) felt "very comfortable" approaching an athletic trainer; in contrast, only twenty-five percent (n= 10) of participants felt very comfortable approaching a head coach, and 32.5 percent (n=13) felt "very comfortable" approaching their assistant coach, for nutrition information.

Table 6. Athlete's Comfort Level for Approaching Various Professionals about Nutrition Information among the Treatment Group (n=40).

Professional	Mean ± SD
Dietitians/Nutrition Professionals	4.58 ± 0.84
Athletic Trainer	4.55 ± 0.78
Sport and Conditioning Coach	4.38 ± 0.95
Assistant Coach	3.70 ± 1.11
Head Coach	3.10 ± 1.52

RQ#2: Eating Attitudes Test (EAT-26) and Underclass Division I Athletes

A second central research question examined the prevalence and risk of eating disorders and disordered eating among the underclass collegiate athletes (n=40) using the

26-item Eating Attitudes Test (EAT-26) developed by Garner and Garfinkel (1979). The highest possible score on the EAT-26 is 78. For data analysis purposes, participants' were categorized as "at risk" if they obtained a score of ≥ 20; participants were categorized as "not at risk" for an eating disorder if they had a score < 20.

Results indicated seven (18%) underclass collegiate athletes met the criteria for being "at risk" for an eating disorder, while 33 (82%) participants were not "at risk" for an eating disorder (Table 7). Of those "at risk," three were gymnasts, two were female soccer players, one was a men's volleyball player, and one was a football player. On average, the participants received a score of 11.0±10.5, with the scores ranging from 0 to 43.

By gender, female athletes had a greater prevalence of eating disorder risk, with five out of the seven "at risk" athletes being female (71%). By sport, gymnastics had the highest EAT-26 score (34.3), while cross-country had the lowest score (2.0) followed closely by swimming (4.0), golf (7.3), and football (8.6). A one-way ANOVA indicated significant differences by sport, with gymnastics scoring higher than all other teams ($F=2.996$, $df = 8/31$, $p= .013$) (Table 7)..

Table 7. Eating Attitudes Test (EAT-26) Scores in the Treatment Group (n=40).

Sport (m=Men; w=Women)	N	Fresh (N)	Soph (N)	EAT-26 Score	At Risk (N)	At Risk (%)	Not at Risk (%)
Gymnastics (w)	3	3	0	34.3±7.8	3	100	0
Golf (m)	3	0	3	11.0±7.2	0	0	0
Volleyball (m)	5	2	3	10.2±9.1	1	20	80
Soccer (w)	11	6	5	10.0±10.6	2	18.2	81.8
Football (m)	12	10	2	8.6±7.8	1	8.3%	91.7%
Golf (f)	3	1	2	7.3±708	0	0	0
Swimming (w)	1	1	0	4.0	0	0	0
X-Country (w)	1	0	1	2.0	0	0	0
Baseball (m)	1	1	0	12.0	0	0	0
All Sports (n=40)	**40**	**24**	**16**	**11.0**	**7**	**17.5%**	**82.5%**

When omitting teams with less than 3 participants (n=37), a one-way ANOVA indicated gymnastics still retained a highly significantly higher EAT-26 score when compared to the other sports (F= 4.446, df=5/31, p=0.013) (Table 8). The Tukey HSD indicated each team scored significantly lower than gymnastics on the EAT -26 (p= .013; F= 2.996) (Table 8).

Table 8. Comparison of Eating Attitudes Test (EAT-26) Scores for Gymnastics by Teams with at Least Three Participants (n=37).

Sport	N	Mean EAT-26 ± SD	Mean Difference	p
Gymnastics	3	34.3 ± 7.8	--	--
Football	12	8.6 ± 7.8	-25.7*	.001
Soccer (women)	11	10.0 ± 10.6	-24.3*	.003
Golf (men)	3	11.0 ± 7.2	-23.3*	.033
Golf (women)	3	7.3 ± 6.8	-27.0*	.009
Volleyball (men)	5	10.2 ± 9.1	-24.1*	.009

**ANOVA F = 4.446; df = 5,31; p = 0.004*

RQ #3: Theory of Anticipatory Guidance and Sport Nutrition Knowledge

The third research question in this thesis examined the change in nutrition knowledge as a result of engaging in the anticipatory guidance sports nutrition presentation. To ensure any change in knowledge resulted from the presentation, a quasi-experimental design was used that included both the treatment group and a control group. The control group consisted of the 31 club sport athletes who attended completed the pre-test (Sports Nutrition Questionnaire; SNQ) after which they listened to a sport psychology presentation and repeated the SNQ (post-test). Only individuals who completed both the pre-test and the post-test were included in the paired analysis.

A total of 71 participants, 40 in the treatment group and 31 in the control group, completed all 20 items on the Sport Nutrition Questionnaire. Cronbach's alpha indicated a reliability index of 0.79. The control group scored, on average, 13.55 ± 2.73 out of a possible 20 points on the SNQ prior to the Sport Psychology Presentation, while the treatment group scored, on average, 13.90 ± 2.56 on the SNQ prior to the anticipatory guidance sport nutrition presentation. A one-way ANOVA revealed no significant difference between groups in the SNQ score prior to the two presentation interventions ($F=.311$; $df=1/69$, $p = .579$) (Table 9).

After the presentations, the treatment group scored an average of 16.40 ± 2.39, while the control group scored 13.77 ± 2.36 out of a possible 20 points. A one-way ANOVA revealed the difference between the two groups was statistically significant ($F=21.249$; $df=1/69$, $p < 0.001$) (Table 9). For the treatment group, the scores on the pre-test ranged from a low of 8 (pre-SNQ) to a high of 18 (post-SNQ); on the post-test, the scores for the treatment group ranged from a low of 10 to a high of 20 (n=2).

Table 9. Pre-Post Sport Nutrition Questionnaire (SNQ) Scores (n=71).

		N	Mean ± SD	F-value	P- value
Pre-SNQ	Exp. Group	40	13.90 ± 2.56	0.311	0.579
	Cont. Group	31	13.55 ± 2.73		
Post-SNQ	Exp. Group	40	16.40 ± 2.39	21.249	0.000
	Cont. Group	31	13.77 ± 2.36		

By gender for the treatment group, females (n=18) scored an average of 16.72 ± 2.53 on the SNQ post-test, while males (n=22) scored an average of 16.14 ± 2.29. A one-way ANOVA revealed no difference by gender on the SNQ post-test (F = 0.586; *df*=1/38; p = 0.449). By class, freshmen (n=23) scored an average of 16.13 ± 2.58 on the SNQ post-test, while sophomore athletes (n=17) scored an average of 16.76 ± 2.14. There was no difference by class standing on the SNQ post-test (F = 0.680; df=1/38; p = 0.415).

When the SNQ post-test scores for the treatment group were compared by sports team for those teams in which there were three or more participants per team, a one-way ANOVA indicated no significant difference by sport team (F=1.148; df=5/31; p = p.356).

Summary

Forty NCAA Division I underclass athletes participated in this study that attempted to determine the effectiveness of the theory of anticipatory guidance as a means to provide "heads up" nutrition information. Results indicated underclass athletes desire more nutrition information, with more than half the athletes interested in information related to alcohol consumption, training and competition diets, eating behaviors, frequency and timing of eating, and hydration. Student athletes anticipated making several behavior changes, including eating breakfast every morning, bringing a water bottle to class, and eating more fruits and vegetables weekly. The participants'

primary source of nutrition information prior to the presentation was their sport and conditioning coach or athletic trainer. Interestingly, they indicated they were most comfortable approaching a dietitian or nutrition professional for nutrition advice. Analysis of the EAT-26 survey indicated 18 percent (n=7) of the athletes were at risk for an eating disorder, with almost half of these being female gymnasts. Results of the Sports Nutrition Questionnaire indicated the "heads up" nutrition information significantly increased the athletes' nutrition knowledge compared to the control group. Within the treatment group, no differences were detected by gender or by academic class.

CHAPTER V

DISCUSSION

The purpose of this mixed-methods, quasi-experimental study was to assess the eating disorder risk and nutrition knowledge of freshmen and sophomore Division I collegiate athletes at a Midwestern university and to determine the viability of using the theory of anticipatory guidance to identify the athletes' nutrition education needs related to alcohol consumption, disordered eating and eating disorders, frequency of eating, hydration, training and competition nutrition, and overall energy consumption. A discussion of the results will be presented in this section.

Anticipatory Guidance

Previous studies have not explored the application of anticipatory guidance (AG) to identify sport nutrition educational needs among collegiate athletes. Results from this study showed AG aided in the identification of the nutrition education needs of underclass collegiate athletes and showed positive responses and attitudes concerning the nutrition topics discussed by the researcher. Most Division I collegiate athletes in this study indicated a strong desire to obtain specific nutrition education needs related to energy consumption, training and competition, frequency of eating, eating behaviors, alcohol consumption, hydration, and overall energy consumption.

In addition to responding to specified nutrition needs, the athletes reported additional nutrition topics of interest not covered during the sport nutrition presentation. The most common nutrition education needs elaborated and cited by the participants pertained to Meal Planning (e.g., meal ideas that meet nutrient needs), Weight Management (e.g., calories needed to gain weight), Food Specific Information (e.g., ingredients to look for on a food product), and Optimizing Performance (e.g., Sport-Specific information). The athletes' interest in additional information as a result of engaging in this anticipatory guidance sports presentation concurs with previous research indicating that AG is beneficial to various health areas to prevent health problems and promote healthy behavior change (American Academy of Pediatrics, 2000; Schuster, et al., 2007; Barkin, et al., 2005; Coker et al., 2006; Nelson, et al., 2005).

The underclass athletes obtained significantly higher post-SNQ scores compared to the control group and indicated specific behaviors they planned to change for the future (e.g., "Eat breakfast every morning"). These results support the findings of the American Academy of Pediatrics (2000) that indicated it is beneficial to provide "heads up" advice to those about to go through developmental changes such as occurs when an athlete matriculates from high school and begins college. These results suggest when student-athletes transitions from high school to college, AG can help identify individual nutrition education needs and promote behavior change.

Anticipatory Guidance and Alcohol Consumption

The AG Questionnaire revealed Division I underclass athletes were interested in receiving additional information on the topic of alcohol when the sport nutrition

presentation was completed, indicating athletes want and need to learn about the effects of alcohol. This topic was in most demand for more information compared to the other five topics presented. Due the increasing use of alcohol among those enter college (Fromme et al., 2008), receiving "heads up" anticipatory guidance or advice about the harmful effects of the misuse of alcohol would be valuable for all incoming freshmen.

This study did not examine the drinking behavior among the underclass collegiate athletes, but anticipatory guidance was provided to demonstrate how the misuse of alcohol may cause dehydration, hamper memory, deplete one's source of energy, constrict metabolism and endurance, cancel gains from a workout, and other health problems. Interestingly, underclassmen athletes in this study reported they planned to "Recommend others or teammates to wait to consume alcohol under 21 years of age" as well as "Recommending others or teammates to limit alcohol consumption" in the future.

The athletes who indicated they felt "neutral" or were "not very interested" in receiving additional information about alcohol were athletes who noted they "did not drink" or "already understand the effects on performance". This study suggests not all athletes choose to drink alcohol and most "non-drinkers" do not wish to learn more about the topic. However, as underclassmen athletes are likely to be under the legal drinking age limit (i.e., 21 years), anticipatory guidance on the impacts of alcohol is recommended to prevent behavior and health problems.

Anticipatory Guidance and Eating Attitudes Test (EAT-26)

Only ten percent of the underclass athletes in this study indicated they were "very interested" in receiving additional information regarding eating behaviors. These athletes

were “majoring in health science” or stated, “I want to lose weight.” However, half of the participants demonstrated they were “somewhat interested” in gaining more information about eating behaviors. This indicates athletes who are “somewhat interested” in eating behavior education may want heads up information regarding weight management and awareness of unhealthy behaviors. As no other studies using the theory of anticipatory guidance to understand the nutrition education needs of student athletes have been identified in the literature, this observation cannot be confirmed or contrasted.

The Eating Disorder Risk assessment (EAT-26) indicated seven of the 40 athletes were “at risk” for an eating disorder. Examples of beliefs/statements on the EAT-26 resulting in higher scores include the following: 1) I am terrified about being overweight; 2) Feel extremely guilty after eating; 3) Am preoccupied with a desire to be thinner; 4) Am preoccupied with the thought of having fat on my body; and 5) Engage in dieting behavior. Results indicated all of the participants from the women’s Gymnastics team were “at risk” for an eating disorder and had EAT-26 scores significantly higher than participants from the other sports involved. This finding supports those of Black et al., (2003) and Garner and Garfinkel (1979) who reported the risk of disordered-eating behaviors is greater in athletes who emphasize leanness or body image, such as gymnastics, and particularly at higher levels of competition. Black et al., (2003) examined the eating disorder risk among athletes from 12 different sports. Their results indicated half of the female gymnasts and 45 percent of the cross-country athletes showed signs of disordered eating. Only one participant in the present study was a member on the cross-country team; results indicated this individual was “not at risk” for an eating disorder. It is important to keep in mind “at risk” does not necessarily indicate

one has an eating disorder, but it does indicate concerns regarding body weight, body shape, and eating (Black et al., 2003; Garner & Garfinkel, 1979).

Beals and Hill (2006) reported 32 percent of female athletes at a Division I university demonstrated disordered eating behaviors, slightly higher than the 26 percent of the female athletes who were "at risk" for an eating disorder in the present study. According to Beals and Hill (2006), athletes who "want to lose weight" may restrict their energy intake, possibly resulting in pathogenic weight control behavior. Adequate anticipatory guidance may be recommended to help prevent future health problems associated with restricted eating, such as osteoporosis, injuries, anemia, malnutrition, amenorrhea, and muscle atrophy.

In contrast to the findings of Raymond-Barker and colleagues (2007), a greater percentage of participants in this study were classified "at risk" for an eating disorder. While 18 percent of Division I athletes in the present study were "at risk," Raymond-Barker revealed 10.2 percent of 48 female athletes were "at risk" (Raymond-Barker et al., 2007).

Seventy-five percent of the athletes in the present study who were "at risk" for an eating disorder were female, similar to the results observed by Quatromoni (2008) who reported 82 percent of the collegiate athletes who were "at risk" for an eating disorder were female.

When the results of the SNQ score *and* the EAT-26 scores were examined simultaneously, and when teams with less than 3 participants were omitted from statistical analysis, results indicated the women's gymnastics team members had both the highest risk for disordered eating but also the highest pre- *and* post-SNQ average score.

Future research studies may want to explore the relationship among nutrition knowledge and eating disorder risk and/or prevalence of an eating disorder.

The results of this study support those of Baer et al, (1995), Quatromoni (2008), and Reinking and Alexander (2005) who have suggested education about eating disorders and other potentially harmful eating behaviors is necessary among collegiate athletes, particularly underclassmen. Providing sport nutrition knowledge may not be adequate for athletes "at risk" to ensure healthy behavior. Access to a Registered Dietitian on a University's campus, however, may enhance the health of collegiate student-athletes as they can: 1) monitor nutrition status and eating patterns; 2) counsel the athletes about energy and nutrient adequacy to support health and performance; and 3) identify problems in eating patterns and help develop strategies to normalize eating patterns (Baer et al, 1995; Quatromoni, 2008; Reinking &Alexander, 2005).

Anticipatory Guidance, Sport Nutrition, and Frequency of Eating

The athletes in the present study who indicated they were "very interested" in receiving additional information about an athlete's frequency of eating were asked to elaborate on or explain their responses. Specific responses received included the need to learn more to address the following concerns: "eat at the best times to enhance my performance"; "lately, feeling like crap during/after workouts; trying to figure out what to eat"; and "I want to know when I should be eating to get the best out of what I've consumed." These comments suggest athletes want more information about how regular intake of food can potentially enhance performance.

Anticipatory guidance provided to an athlete may need to be individualized due to the collegiate athletes' schedule, physical demands, and condition. The anticipatory guidance provided in this study regarding "frequency of eating" focused on the athlete's need to prepare for meals and snacks due to the demands of being a student athlete. Similar to Murphy and colleague's study (1998), the importance of a nutrient-dense breakfast was presented due to the increased functioning for students as well as sustaining an athlete for training, competition, and walking to/from class. When the athletes responded to the Anticipatory Guidance Questionnaire "How they plan to change" post-presentation, the most common change reported was "Eat breakfast every morning" while more than half reported they would "Eat more throughout the day." Other common changes were "Packing healthy snacks during the day" and "Bring a water bottle to class." These findings are similar to those reported by Ziegler et al., (2002) who reported athletes need to prepare and potentially increase their frequency of eating/drinking throughout the day to help distribute energy intake, prevent gastrointestinal consequences, prevent overeating, and safeguard fatigue..

The underclassman in the present study who indicated they were "not at all interested" in receiving additional information regarding frequency of eating explained they were "already eating regularly." Lack of previous research regarding anticipatory guidance and nutrition education needs among underclass collegiate athletes makes it difficult to compare these findings, but the physical and mental demands of an athlete make this topic an important issue to understand and practice.

Anticipatory Guidance, Sport Nutrition, and Hydration

Those who indicated they were "very interested" in receiving additional information regarding hydration further elaborated with the following statements: "I barely take in 20 fluid ounces/day," "Help especially in season/pre-season," and "This is something I need to work on." These statements suggest underclassmen athletes would benefit from anticipatory guidance to prevent dehydration and enhance performance through adequate hydration. If the athletes who reported they lacked adequate personal fluid intake are poorly hydrated, this would be in agreement with the results of Volpe et al. (2009) who found that 66 percent of Division I athletes appeared to be under-hydrated prior to training/practice.

The participants who received anticipatory guidance in this study were taught about the importance of increased fluid needs, dehydration (loss of >2% of body weight) symptoms, and self-evaluating techniques to help determine hydration status (e.g., pre-post training body weight). After the presentation, athletes indicated they planned to "Limit caffeine" and planned to "Bring a water bottle to class." These statements are compelling, as drinking water is an accessible beverage for all college students.

Underclassmen athletes who indicated they were "not at all interested" in receiving additional education about hydration stated they either "hydrate my body in the correct amount and way" or "I think I know enough in this area." Due to the increased awareness of the importance of hydration among sports teams (e.g., Gatorade commercials), coaches, athletic trainers, and registered dietitians should be encouraged to continue to teach athletes about the ease and protocols to maintaining adequate hydration

to reduce fatigue, enhance performance, and decrease risk for life-threatening heat injuries.

Anticipatory Guidance, Sport Nutrition, and Training/Competition

The topic "Training and Competition" was of great interest to the athletes while some indicating they were "very interested" in obtaining additional information. A few of the following statements further explain the athletes' interest: "I am going into an intense offseason," "Be able to perform my best in competition," "This is something I believe would help me a lot," and "Know what foods will enhance my training and competition performance the most." These results are not surprising due to the competitive nature and increased energy needs (additional calories) of Division I collegiate athletes.

The "training and competition" related changes the participants planned on adopting post-intervention are consistent with numerous studies (Walker et al., 2000; & Steinmuller et al., 2009) and with the position of the ADA (Rodriguez et al., 2009). For example, more than half of underclassmen athletes within this study plan to "Eat something before early morning workouts" which agrees with the suggestion made by Steinmuller et al. (2009) that many athletes do not like to compete/train on a full stomach, so planning meals should be individualized to ensure athletes consumes enough energy to prepare them for the upcoming activity. Over half of the athletes in this study stated they were going to "Eat a pre-game meal 3-4 hours before competition," concurring with the recommendations made by Walker et al (2000) and the position paper of the ADA (Rodriguez et al., 2009) for those competing in endurance sports.

Post-exercise regimen did not go unnoticed among the athletes in this study. The nutrition education presentation stressed the importance of replenishing glycogen losses and promoting positive muscle protein balance by consuming carbohydrates and protein after training/competition. The researcher recommended that the athletes consume a post-exercise carbohydrate+protein rich snack, such as 12-16 ounces of low-fat chocolate milk, which is easily obtained from the University's many cafeterias. After the anticipatory guidance was provided, two-thirds of the athletes indicated they planned to "Consume a recovery snack within 30 minutes after practice or lifting (e.g., Chocolate milk)" for the future. This anticipated behavior change would comply with the recommendations made by several researchers who promote post-exercise supplementation (Tarnopolsky et al., 1997; Tipton et al., 1999; Karp et al., 2006; and Steinmuller et al., 2009).

Only ten percent of the athletes who participated in the current study indicated they were "not at all interested" in receiving additional education regarding the topic of training and competition. None of these four athletes elaborated as to "why" they felt this way. Evidence from the remaining 90 percent of the athletes indicates there may be need for additional information about the nutritional needs during training and competition among underclass collegiate athletes. Providing anticipatory guidance would be beneficial to ensure the athletes are meeting their needs for training and competition.

Anticipatory Guidance, Sport Nutrition, and Overall Energy Consumption

No athlete indicated they were "very interested" in receiving additional information about the topic of "Overall Energy Consumption" after the anticipatory guidance was provided. Nonetheless, the underclassmen athletes generated 13 elaborated

responses regarding this topic, to include: “I struggle with fatigue and would like to fix it,” “Since I am an athlete and poor eater, need info if I plan to slowly change,” “I want energy, but I also want to lose weight,” “I would like help in season,” and “I want a healthier diet for myself.” These comments suggest the athletes wanted to learn how to make dietary changes based upon their individual need. For example, one athlete felt they “struggle with fatigue” while another “would like help in season.” Providing athletes with heads up nutritional anticipatory guidance to prevent fatigue and optimize performance during season would be beneficial to these athletes.

Providing underclassmen collegiate athletes with anticipatory guidance may give athletes education to help guide them to make sport- and health- enhancing foods. After the nutrition presentation was provided, more than half of the athletes stated they planned to “Eat more fruits and vegetables (weekly),” while some revealed they would “Avoid too much saturated fats and trans fats.” Interestingly, more than half stated they would “Pack healthy snacks during the day” and “Try to incorporate new sources of lean protein into the diet (i.e., beans).” These comments reveal that anticipatory guidance may “plant the seed” to start making healthier food choices, such as consuming more fruits and vegetables per week or packing snacks while on campuses.

Hinton and colleagues (2004) found female collegiate athletes consumes 2141±781 calories/day (fewer than the average 2200 kcal/day recommendation), while male collegiate athletes consumed 2447±1053 calories/day (fewer than the average. 2900 kcal/day recommendation). If anticipatory guidance is provided, it may help close the gap of collegiate athletes under-eating their average daily caloric need.

The American Dietetic Association's position on energy requirements suggests athletes will exceed the amount of calories/day in the highest range of servings for the various food groups such as fruits and/or vegetables (Rodriguez et al., 2009). The participants in this study were taught about their greater energy needs, but individual energy requirements could not be provided during the presentation. It may be beneficial to have a registered dietitian calculate each athlete's individual caloric needs; this anticipatory guidance would give athletes an idea of how many calories they need to consume during pre-season, in-season, and off-season.

Anticipatory Guidance and Sport Nutrition Knowledge

The AG sport nutrition intervention significantly improved the sport nutrition knowledge, based on SNQ scores, among the underclass collegiate athletes who participated in this study. Hornstrom et al. (2011) examined the nutrition knowledge of Division I softball players; there was no nutrition education intervention. Results indicated only 35 percent of the 185 athletes who completed her survey "passed" the sport nutrition questionnaire with a score of 60 percent or higher. The average score on Hornstrom's 80 question test was 57 percent correct. In contrast, the average score on the pretest in the present study was 13.9 out of 20, or 70 percent, indicating the underclass athletes in the present study were more knowledgeable about nutrition than the athletes examined by Hornstrom (2011). It should be noted that the SNQ used in the present study was an abbreviated version of the questionnaire used by Hornstrom (2007), which might have been more difficult due to the greater number of questions (80 vs. 20 questions).

Jacobsen and colleagues (2001) reported nearly half of the athletes in their study believed dietary fat should make up less than 12 percent of one's total calories. In the present study, one-third of participants in this study indicated less than 15 percent of one's calories should come from dietary fat, even though the athletes were presented with evidence to the contrary during the sports nutrition presentation. Sixty-five percent of the underclass athletes in this study correctly verified that vitamins are not a source of energy. In contrast, 29.9 percent of the male athletes in Jacobsen's study (2001) believed vitamins provided immediate energy. Clearly, information about the function of vitamins and minerals and sources of energy is needed among collegiate athletes.

Similar to the present study, Abood and colleagues (2004) found that athletes increased their nutrition knowledge after a nutrition intervention called the ATHENA program (Athletes Targeting Healthy Exercise and Nutrition Alternatives Program). The ATHENA program involved eight weekly sessions with high school athletes. As a result of the intervention, the participants significantly decreased weight-loss pill usage and muscle-building supplements. Evidence indicates that athletes in both the ATHENA program and in the current study either changed their behavior, or indicated they were planning on changing nutrition-related behaviors (e.g., "eating breakfast every morning" to promote better performance and overall health) as a consequence of participating in a nutrition-related intervention.

Results from the post-SNQ indicated more than half of the subjects understood the following concepts: 1) carbohydrates are the first source of energy; 2) alcohol is more calorically dense than dietary protein; 3) the type of food an athlete eats impacts performance; 4) a pre-event meal should occur 3-4 hours prior to competition; 5) eggs

and legumes are good sources of protein; 6) caffeine increases a person's risk of dehydration; and 7) high fat meals should not be consumed prior to athletic events.

Underclass Division I Athletes' Sources of Nutrition Education Information

Most of the athletes felt they would be "very comfortable" obtaining nutrition information from registered dietitians, but very few colleges and universities have access to full-time registered dietitians hired to provide nutrition education, advice, and counseling to the athletes according to numerous University websites. Access to a registered dietitian is most likely a barrier if athletes are seeking nutrition information specific to their sport and overall health. Most of the subjects indicated they received nutrition information from their strength and conditioning coaches or from athletic trainers, rather than from a registered dietitian or other nutrition professionals prior to the AG presentation.

These results are similar to several previous studies that indicated Division I athletes are more likely to receive nutrition information from the strength and conditioning coach, athletic trainer, team coach, or magazines (Jacobsen et al., 2001;Hornstrom et al., 2011). Rockwell and colleagues (2001) examined the nutrition knowledge of 35 coaches and 18 athletic trainers from Division I college. Results indicated the trainers and coaches scored an average of 67 percent on a nutrition knowledge questionnaire, making the advice they disseminate suspect. This researcher agrees with Rockwell and colleagues (2001) when they concluded that nutrition professionals and psychologists are underutilized, especially when dealing with disordered eating among athletes (Rockwell et al., 2001).

Summary

It is important to recognize the nutrition education needs and eating disorder risk of underclass collegiate athletes. Collegiate athletic programs need to understand what athletes need and want to know regarding nutrition and overall health in order to meet individual requirements. Anticipatory guidance providing underclass collegiate athletes with appropriate nutrition education must be addressed early in their career in an effort to prevent future health problems and enhance performance. Freshmen and sophomore collegiate athletes would benefit from an eating disorder risk assessment and handing underclassmen with counseling center information should be practiced even if an athlete does not show "signs" of an eating disorder or disordered eating. Athletes responded positively when given sport nutrition anticipatory guidance and were "very interested" in receiving additional information while improving their Sport Nutrition Knowledge. When working with athletes, it is important to provide them with accurate and beneficial sport nutrition information and registered dietitians should be the health professional of choice for sports teams and athletic programs.

CHAPTER VI

CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH

The purpose of this mixed-methods, quasi-experimental study was to assess the eating disorder risk and nutrition knowledge of freshmen and sophomore Division I collegiate athletes at a Midwestern university and to determine the viability of using the theory of anticipatory guidance to identify the athletes' nutrition education needs related to alcohol consumption, disordered eating and eating disorders, frequency of eating, hydration, training and competition nutrition, and overall energy consumption. The conclusion of the study, limitations, and recommendations for future research are presented in this chapter.

Conclusions

This study utilized the theory of anticipatory guidance, which can, in theory, prevent problems before they arise. It has been well documented anticipatory guidance has been positively favored by the American Academy of Pediatrics, Physicians and parents. To date, however, this research appears to be the first study to use anticipatory guidance with freshmen and sophomore collegiate athletes to identify specific sports-nutrition education needs. This research also identified the eating disorder risk and sport nutrition knowledge in these underclass NCAA Division I athletes.

This research strived to gain more information on what underclass athletes want and need to know in order to enhance their performance and to gather a better understanding on the benefits of adequate nutrition for overall well-being. Results indicated using anticipatory guidance early in an athlete's collegiate career could help identify the nutrition education needs of underclass collegiate athletes. The participants in this study requested additional information related to weight management (e.g., weight gain and weight loss), personal sport-specific education, enhanced performance (e.g., training/competition diet), and improving nutrition knowledge in order to make appropriate and beneficial food/beverage choices. Comments such as "diet is extremely important especially when transitioning to a new environment" and "if I started now by my Jr. and Sr. year I would be performing at my best" adhered to the purpose of anticipatory guidance. The intervention provided heads up nutrition related advice to help the underclassmen better understand the importance of adequate nutrition early in their college careers.

Interestingly, the topics in most demand to receive additional information related to alcohol consumption (40% "Very interested") and diet pertaining to training and competition (35% "Very interested"). The qualitative results also showed participants planned to change specific behaviors for the future. The most common "planned to change" behaviors included "eating breakfast every morning", "bring a water bottle to class", and "consume more fruits and vegetables on a weekly basis." These planned behavior changes concur with previous research; the use of anticipatory guidance can influence the future for those going through developmental and environmental changes.

As 18 percent of the athletes revealed they were/are at risk for an eating disorder, awareness and counseling brochures provided by the researcher may potentially assist in decreasing future health complications. Those at risk for an eating disorder demonstrated popular unhealthy thoughts such as "terrified being overweight", "am preoccupied with the desire to be thinner", and "feel extremely guilty after eating." These beliefs should spark immediate concern for health professionals involved with collegiate athletes. Two of the seven athletes whose score indicated they were "at risk" for an eating disorder were male while three of the seven were female gymnasts. Research indicates individuals who participate in sports that emphasize a lean physique, as well as environmental pressures to gain or lose weight, appear to spark unhealthy responses on the EAT-26 assessment. Coaches, teammates, strength and conditioning coaches, and athletic trainers should be encouraged to "fine-tune" their ears and be aware of individuals exhibiting disordered eating and eating disorder red-flag behaviors, thoughts, and statements. Athletic departments and health professionals should be aware of the prevalence of eating disorders and disordered eating that may be increasing in male sports (e.g., Men's Volleyball, Football, and Wrestling) as well as maintaining a presence in sports that emphasize low body fat percentage and a sport-specific appearance.

Not only did the AG intervention reveal what the athletes desired to know and provided the opportunity to assess eating disorder risk, but underclassmen athletes obtained significantly higher post-SNQ scores compared to the control group (University Club Team members) participating in the AG mental training intervention. This finding indicated the nutrition related AG improved sport nutrition knowledge, giving athletes a better understanding of the role of healthy eating/drinking. Even though this intervention

was limited to a two-hour education session provided by the researcher, the results indicate it impacted the athletes in a positive way. Follow-up assessments and surveys were not part of the present study, but it would be an opportunity for future research to analyze AG's impact when underclassmen athletes reach senior year.

Registered dietitians, sports nutrition certified registered dietitians, high school athletic departments, and college/university athletic departments should take note of using AG during the beginning stages of an athlete's career. Based on the results in this study, athletes want to obtain and follow sport-enhancing diet behaviors and the earlier an athlete can better understand nutrition education it may set them up for a more successful and healthy future. In fact, 98 percent of the forty-athletes participating in this study felt AG regarding nutrition would be beneficial for their future careers. All underclassmen collegiate athletes should be allowed the opportunity to receive sport nutrition related AG prior to their freshmen year to prepare them for the upcoming changes and different nutritional needs.

Disturbingly, 77 percent of the athletes indicated they received most of their nutrition information from their strength and conditioning coach. Although strength and conditioning coaches have a much-valued role within collegiate athletics, their position as the nutrition educator is not ideal. There is a need for registered dietitians to be hired into all athletic departments to assess, counsel, and monitor the athlete's nutrition just like a coach is needed to prepare and train athletes for competition. Unfortunately, not all collegiate athletic departments have the finances to hire a registered dietitian whose time is dedicated solely to working with the athletic teams. If hired, a registered dietitian could provide pre-season AG, in-season presentations, one-on-one counseling, and

cooking demonstrations along with a plethora of other activities. Athletic departments are urged to incorporate registered dietitians into their budgets. The demand for sport nutrition related AG is wanted and needed by underclassmen athletes; therefore, it is up to universities and athletic departments to make the choice to involve registered dietitians to supply the athlete's desire to gain more nutrition education.

Limitations of the Study

As the reader examines the results of this study, several limitations must be considered:

- The treatment group in the present study was limited to one Midwestern Division I University and forty participants.
- Although the presentation was developed with the assistance of two registered dietitians, the actual AG interventions were provided by the researcher, a Graduate Student who was obtaining her Master's of Science in Dietetics who also held a B.S. in Exercise Science, rather than a registered dietitian.
- The researcher obtained all of the education materials from the Sports, Cardiovascular and Wellness Nutrition (SCAN) website and from registered dietitians; future studies would benefit from hiring a registered dietitian certified in sports nutrition to provide the AG presentation.

Recommendations for Further Research

Based on the results of the present study, additional research on the utilization of anticipatory guidance should be conducted to fulfill the athlete's desire to obtain more nutrition education. The following suggestions are made:

- Interventions on a more regular basis may be more beneficial for the athlete considering this study's intervention was limited to a single, two-hour education session. This could be multiple presentations, providing AG, during pre-seasons and in-seasons for University underclassmen athletes.
- Sport-specific AG could be presented on a more frequent basis and then the researcher could analyze the impact of AG for an athlete's future career (e.g., analyze the behavior changes one makes as a senior after having had AG interventions as a freshmen or sophomore).
- It would also be of interest to research other age groups such as high-school student athletes and middle school student athletes. Providing and evaluating AG while athletes are these prime physical growth periods, such as teenage years, is of interest to better understand heads up nutritional education.

In summary, using the theory of anticipatory guidance to relay sports nutrition education to athletes early in their sport-career improves sport nutrition knowledge, provides an opportunity to assess eating disorder risk, and provides heads up advice to promote behavior change in the present and future. Future research is needed to evaluate if the results and findings in this study is a recurring trend among other age groups, underclassmen athletes, and athletes at risk for nutrition related health problems.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD MATERIALS

A-1 IRB Letter of Approval

A-2 CITI Certificate of Completion

A-1 Letter of Approval

Institutional Review Board

DATE:	October 19, 2010
TO:	Lindsay Martin, Exercise Science
FROM:	
RE:	IRB protocol # 188235-3
TITLE:	Theory of anticipatory guidance to effectively identify nutrition education needs, eating disorder risk, and nutrition knowledge/attitudes among freshmen and sophomore collegiate athletes
SUBMISSION TYPE:	Revision
ACTION:	APPROVED
DECISION DATE:	October 19, 2010
EXPIRATION DATE:	October 18, 2011
REVIEW TYPE:	Expedited Review

The Institutional Review Board has approved your Revision for the above protocol, effective October 19, 2010 through October 18, 2011. All research under this protocol must be conducted in accordance with the approved submission.

As a reminder, it is the responsibility of the P.I. and/or faculty sponsor to inform the IRB in a timely manner:

- when the project is completed,
- if the project is to be continued beyond the approved end date,
- if the project is to be modified,
- if the project encounters problems, or
- if the project is discontinued.

Any of the above notifications should be addressed in writing and submitted electronically to the IRB (http://www.bsu.edu/irb). Please reference the IRB protocol number given above in any communication to the IRB regarding this project. Be sure to allow sufficient time for review and approval of requests for modification or continuation. If you have questions, please contact Chris Mangelli

A-2 CITI Certificate of Completion

CITI Collaborative Institutional Training Initiative

Social & Behavioral Research - Basic/Refresher Curriculum Completion Report
Printed on 7/13/2010

Learner: Lindsay Martin (username: lmmartin024)
Institution: [redacted]
Contact Information [redacted]
Department: Dietetics
Phone: 513 518 8531
Email: [redacted]

Social & Behavioral Research - Basic/Refresher: Choose this group to satisfy CITI training requirements for Investigators and staff involved primarily in Social/Behavioral Research with human subjects.

Stage 1. Basic Course Passed on 07/13/10 (Ref # 4626384)

Required Modules	Date Completed	Score
Belmont Report and CITI Course Introduction	07/07/10	3/3 (100%)
Students in Research - SBR	07/07/10	10/10 (100%)
History and Ethical Principles - SBR	07/08/10	4/4 (100%)
Defining Research with Human Subjects - SBR	07/09/10	4/5 (80%)
The Regulations and The Social and Behavioral Sciences - SBR	07/12/10	4/5 (80%)
Assessing Risk in Social and Behavioral Sciences - SBR	07/12/10	5/5 (100%)
Informed Consent - SBR	07/12/10	5/5 (100%)
Privacy and Confidentiality - SBR	07/12/10	3/3 (100%)
Research with Prisoners - SBR	07/12/10	4/4 (100%)
Research with Children - SBR	07/13/10	4/4 (100%)
Research in Public Elementary and Secondary Schools - SBR	07/13/10	3/4 (75%)
International Research - SBR	07/13/10	3/3 (100%)
Internet Research - SBR	07/13/10	4/4 (100%)
HIPAA and Human Subjects Research	07/13/10	2/2 (100%)
Workers as Research Subjects-A Vulnerable Population	07/13/10	4/4 (100%)
Conflicts of Interest in Research Involving Human Subjects	07/13/10	2/2 (100%)
Ball State University	07/13/10	no quiz

For this Completion Report to be valid, the learner listed above must be

affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Course Coordinator

Return

APPENDIX B

MATERIALS TO INVITE ATHLETES

B-1: Letter of Invitation to Underclassmen

B-2: Flyer of Invitation Placed in Weight Room

B-1: Letter of Invitation to Underclassmen

Dear Athlete,

I am a current Graduate Student studying Nutrition/Dietetics. My undergraduate degree was in Exercise Science at BSU and I am a former collegiate soccer player and Assistant Coach for both Golf Teams. I am writing to invite you to participate in a research study that has been approved and supported by the Athletic Department and Head Coach of your team.

My study involves a Sports Nutrition presentation covering the following topics: overall energy consumption, training and competition, hydration, frequency of eating, disordered eating/eating disorders, and consumption of alcohol. I hope to provide you with practical, "heads up", nutrition advice along with helpful suggestions to help you improve your performance and overall health. I hope to make this a great learning experience for you and your teammates. Survey instruments will be used to help identify your nutrition education needs, to evaluate personal eating attitudes, and examine your nutrition knowledge and attitudes. All surveys will be Anonymous and kept strictly confidential. The only place where you will record your name will be on the consent form. Healthy snacks will be provided by the researcher.

The presentation will take place on Tuesday, October 26th from 7:00 pm-9:00 pm in the Arena Lounge (room across from the main floor Ticket Office) found in the Health and Physical Activities Building (HP).

Please email me at by October 26th at 4:00 pm if you wish to commit to this study. I will be glad to contact you prior to the presentations to remind you of the time and location. Thank you so much for your time.

Sincerely,

Lindsay M. Martin
Graduate Student

B-2: Flyer of Invitation Placed in Weight Room

Sports Nutrition Presentation

Presented by Lindsay M. Martin (Graduate Student)

Presentation and research study for

freshmen and *sophomore* collegiate athletes

Wednesday, October 26th 7:00 pm- 9:00 pm

ARENA LOUNGE (room across from first floor main ticket office)

Heads up nutritional advice will be provided to potentially improve your athletic performance, recovery, and overall health. Topics discussed include the following:

- Overall Energy Consumption
- Training and Competition
- Hydration
- Frequency of Eating
- Disordered Eating and Other Eating Behaviors
- Consumption of Alcohol

Those who must attend study tables will receive two hours toward your weekly requirement. Please bring the needed paper work for the presenter and/or faculty member to sign.

Please contact Lindsay Martin if you have questions and/or wish to attend.

APPENDIX C

LETTER OF INFORMED CONSENT

C-1: Letter of Informed Consent: Control Group

C-2: Letter of Informed Consent: Treatment Group

C-1 Letter of Consent to Control Group

Month Day, 2010

Dear University Club Athlete,

You are being asked to participate in a study being conducted to determine if the theory of anticipatory guidance – sometimes called "heads up" advice – can help identify educational needs of collegiate athletes.

To aid in this endeavor, we would like you to answer twenty "true-false" questions prior to and after this motivational presentation enhancing peak performance. The total time spent completing the pre- and post-survey instruments will be approximately 5 minutes. All responses collected in this study will be confidential. Your name will NOT be included on any form or research instrument other than this informed consent.

There are no foreseeable discomforts in completing the surveys or participating in the nutrition lecture. Your participation is voluntary and you may withdraw from the study at any time and for any reason. There is no penalty for not participating or withdrawing. There are no known personal benefits from participating in this study; however, your participation will help advance the science related to the use of anticipatory guidance.

This project has been reviewed by the University Institutional Review Board to ensure all procedures meet acceptable guidelines governing your participation in this research. Please sign below if you agree to participate in this study. Thank you.

Sincerely,

Lindsay M. Martin
Graduate Student

My signature below indicates my willingness to participate:

Name (please print): _____ Date: _____

Signature: _____

C-2 Letter of Consent to Treatment Group

October 26, 2010

Dear Underclassman Collegiate Athlete,

The study is being conducted to use the theory of anticipatory guidance- sometimes called "heads up" advice- to: 1) identify nutrition education needs, 2) evaluate eating disorder risk, and 3) intervene to change nutrition knowledge and attitudes among freshmen and sophomore collegiate athletes. The anticipatory guidance will provide nutrition advice concerning alcohol consumption, disordered eating, frequency of eating, hydration, training and competition, and overall energy consumption.

The presentation will last approximately 2 hours. You will be asked to complete an Eating Attitudes Test 26 (EAT-26) to evaluate eating disorder risk, a Sport Nutrition Questionnaire to examine nutrition knowledge and attitudes, and a survey with open-ended questions to help identify nutrition education needs among freshmen and sophomore collegiate athletes. The total time spent completing all survey instruments will take approximately 15 minutes. All responses collected in this study will be confidential. Your name will NOT be included on any form or research instrument other than this informed consent.

There are no foreseeable discomforts in completing the surveys or participating in the nutrition presentation. Your participation is voluntary and you may withdraw from the study at any time and for any reason. There is no penalty for not participating or withdrawing. The personal potential benefits for your participation include: 1) increased sports nutrition education regarding areas of predetermined concern (alcohol consumption, disordered eating, frequency of eating, hydration, training and competition, and overall energy consumption); 2) nutrition education early in your collegiate athlete career; and 3) nutrition "heads up" advice that could potentially improve your athletic performance.

This project has been reviewed according to University Institutional Review Board to ensure all procedures meet acceptable guidelines governing your participation in this research. Please sign below if you agree to participate in this study. Thank you.

Sincerely,

Lindsay M. Martin
Graduate Student

My signature below indicated my willingness to participate:

Name (please print): _____ Date: _____

Signature: _____ Date: _____

Information for Subjects

This study is being conducted by Lindsay Marie Martin, a Graduate Student in Dietetics in the Department of Family Consumer Science. She may be reached at (xxx) xxx-xxxx or LMMARTIN@xxx.edu for questions or complaints. You may also contact her major professor, Dr. Carol Friesen, at xxx-xxx-xxxx or cfriesen@xxxu.edu. For questions about your rights as a research subject, please contact the Director, Office of Research Compliance at (xxx) xxx-xxxx or at irb@xxx.edu.

If you have any personal concerns you may contact the University's Counseling Center at (xxx) xxx-xxxx or visit the counseling staff in xxxxxxx Hall, room 320. You will be responsible for the costs of any care that is provided. It is understood that in the unlikely event that treatment is necessary as a result of your participation in this research project that the University, its agents and employees will assume whatever responsibility is required by law. The primary mission of the Counseling Center is to assist students in reaching their educational goals, as well as to improve their quality of life.

APPENDIX D

QUESTIONNAIRES USED TO CONDUCT RESEARCH

D-1: EAT-26 Questionnaire

D-2: Sports Nutrition Questionnaire Pre-Test/Posttest

D-3: Qualitative Survey

D-1: EAT-26 Questionnaire

EATING ATTITUDES TEST (EAT-26)

Completing the EAT-26 and Sport Nutrition Questionnaire will take you about 5 minutes. The test is designed to either self-administered or administered by health professionals, school counselors, coaches, camp counselors, and others. ***All self-reported measures require open and honest responses in order to provide accurate information.***

PLEASE CIRCLE: MALE FEMALE SPORT _____

Please check a response for each of the following statements:	Always	Usually	Often	Sometimes	Rarely	Never
1. I am terrified about being overweight.						
2. Avoid eating when I am hungry.						
3. Find myself preoccupied with food.						
4. Have gone on eating binges where I feel that I may not have been able to stop.						
5. Cut my food into small pieces.						
6. Aware of the calorie content of foods that I eat.						
7. Particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)						
8. Feel that others would prefer if I ate more.						
9. Vomit after I have eaten.						
10. Feel extremely guilty after eating.						
11. Am preoccupied with a desire to be thinner.						
12. Think about burning calories when I exercise.						
13. Other people think that I am too thin.						
14. Am preoccupied with the thought of having fat on my body.						
15. Take longer than others to eat my meals.						
16. Avoid foods with sugar in them.						
17. Eat diet foods.						
18. Feel that food controls my life.						
19. Display self-control around food.						
20. Feel that others pressure me to eat.						
21. Give too much time and thought to food.						
22. Feel uncomfortable after eating sweets.						
23. Engage in dieting behavior.						
24. Like my stomach to be empty.						
25. Have the impulse to vomit after meals.						
26. Enjoy trying new rich foods.						
TOTAL SCORE						

D-2: Sports Nutrition Questionnaire Pre-Test/Posttest

SPORT NUTRITION QUESTIONNAIRE

Please indicate your reaction to each statement by selecting the alternative that best corresponds with how YOU feel about that statement.

	True	False	Don't Know
1. Foods high in carbohydrate are more easily and rapidly digested than foods high in protein or fat.			
2. Two slices of sandwich bread are equivalent to one ounce from the breads, cereals, and grains food group.			
3. Protein is the primary source of muscular energy for athletes.			
4. No more than 15% of the calories in an athlete's diet should come from fat.			
5. Alcohol has more calories per gram than protein.			
6. Athletes who eat a meatless diet (e.g., vegan) have a higher risk for iron deficiency than athletes who eat meat.			
7. Vitamins are a good source of energy.			
8. Fiber in the diet may help to decrease constipation, decrease blood cholesterol levels, and prevent certain cancers.			
9. Dehydration can impair physical performance.			
10. During exercise, the ingestion of a large amount of fluid at one time is healthier than the frequent ingestion of smaller amounts of fluid.			
11. Alcohol consumption interferes with the absorption and utilization of nutrients.			
12. A muscular person expends more energy at rest than a non-muscular person of the same age, sex, and weight.			
13. The type of food an athlete eats effects their performance.			
14. Athletes should schedule their activities so they have time to eat.			
15. The pre-event meal should be eating about 3-4 hours before competition.			
16. Eggs and legumes are good sources of protein.			
17. All red meat is high in saturated fat.			
18. Antioxidants help prevent the formation of free-radicals.			
19. Caffeine can increase a person's risk of dehydration.			
20. Athletes should consume a high fat meal prior to an event in an effort to maximize their energy production.			

Thank you for your participation.

D-3: Qualitative Survey

ANTICIPATORY GUIDANCE SURVEY

Please answer questions to the best of your ability. Your responses are confidential and your name or sport will not be identified.

1. Please indicate whether you are male or female: Male Female

2. Sport: _____

3. Day of Birth (ex. April 14th) + Last 4-digits of your Cell Phone # : _____
   Example: 14-8531

Check the box that applies to your feeling/attitude.	Not at all interested	Not very interested	Neutral	Somewhat interested	Very interested
4. How interested are you in receiving additional information on **alcohol consumption**?					
If you replied #4 as "Not at all interested" or "Very interested", please explain…					
5. How interested are you in receiving additional information on **eating behaviors?**					
If you replied #5 as "Not at all interested" or "Very interested", please explain…					
6. How interested are you in receiving additional information on **frequency and timing of eating**?					
If you replied #6 as "Not at all interested" or "Very interested", please explain…					
7. How interested are you in receiving additional information on **hydration**?					
If you replied #7 as "Not at all interested" or "Very interested", please explain…					
8. How interested are you in receiving additional information on **training and competition diet**?					
If you replied #8 as "Not at all interested" or "Very interested", please explain…					
9. How interested are you in receiving additional information on **overall energy consumption** (total food intake)?					
If you replied #9 as "Not at all interested" or "Very interested", please explain…					

10. Prior to the nutrition education provided during the presentations what were your sources of receiving nutritional information? Circle all that apply.

Head Coach Assistant Coach Sport and Conditioning Coach Athletic Trainer

Parents Friends Internet Magazines Classes

Dietitians/Nutrition Professionals Other: _____

11. If you were to request nutritional information or advice, how comfortable would you feel approaching the following personnel? Check the box that applies to your attitude/feeling.

Personnel	Not at all comfortable	Not very comfortable	Neutral	Somewhat comfortable	Very comfortable
Head Coach					
Assistant Coach					
Strength & Conditioning Coach					
Athletic Trainer					
Registered Dietitian					

12. What other nutrition guidance or nutrition concerns do you feel would be beneficial to learn in order to increase sport performance and overall health?

13. If you were to receive more nutritional "heads up"/preventative advice based upon your recent transition into college, do you believe it would help in your future athletic career? Please explain your answer.

14. Based upon the nutrition education presentations provided by the researcher, how do you plan to *change* personal eating habits? Check all that apply.

_____Wait to drink alcohol until 21 years of age
_____Limit alcohol consumption
_____Eat more throughout the day
_____Eat breakfast every morning
_____Limit caffeine
_____Eat something before early morning workouts
_____Bring water bottle to class
_____Pack healthy snacks during the day
_____Read nutrition labels
_____Increase meal planning
_____Eat more fruits and vegetables (weekly)
_____Avoid too much saturated fats & trans fats
_____Choose healthy options on travel trips
_____Eat a pre-game meal 3-4 hours before competition
_____Consume a recovery snack within 30 minutes after practice or lifting (ie. Chocolate milk)
_____Try to incorporate new sources of lean protein into the diet (ie. Beans)
_____Increase consumption of Fish (weekly)

Please add any other changes you plan to make……

_____

_____

_____

_____

THANK YOU!

APPENDIX E

ANTICIPATORY GUIDANCE

SPORT NUTRITION PRESENTATIONS (POWER POINT)

Sports Nutrition

Presented to University Division I Athletes
Freshmen and Sophomores 2010

Lindsay Martin, Graduate Student

Personal Introduction

- Hometown: Fairfield, Ohio
- Undergraduate Degree completed in 2008: Exercise Science
- Former University Athlete and Graduate Assistant: Soccer (2004-2008), Men and Women's Golf G.A. (2008-2009)
- Personal Nutrition Observation: Freshmen year to present day
- Dietetic Graduate Student: One more year

EATING ATTITUDES TEST (EAT-26) & SPORT NUTRITION QUESTIONNAIRE

THIS SHOULD ONLY TAKE 5-7 MINUTES TO COMPLETE
(CONFIDENTIAL)

University Soccer, 2007

I have been in your shoes…

Objectives

- "Heads up" advice
- Provide nutrition education specific to underclassmen collegiate athletes

NUTRITION TOPICS

- Specifically discussing the following:
  - **Frequency of Eating**
  - **Hydration**
  - **Training and Competition**
  - **Overall Energy Consumption**
  - **Disordered Eating/Eating Disorders**
  - **Alcohol Consumption**

Why you?!

- **Transition from High School to College**
  - New personal freedom
  - Environment: dorms, apartments, campus dining, walking to class, etc.
  - *Student Athlete = Busy Schedule*
    - Class, practice, study tables, homework, meetings, social life, traveling, weight room, sleeping, etc.
  - When, where, and what to eat?!
  - Underclassmen at greater nutritional risk

Sports Nutrition… Who Delivers?

- Other than genetics and training, what an athlete eats is probably the most important determinate of success in sports.
- Questions to ask yourself?
  - If you were told you could improve your performance by 15% by getting an extra hour of sleep per night, would you do it?
  - If you were told you could improve your performance by 15% by spending an extra hour in the weight room per week, would you do it?
  - **If you were told you could improve your performance by 15% by following a sport-enhancing diet, would you do it?**

DEFINITIONS

- **SPORTS NUTRITION**: study of substances found in food that are not only essential to life, but also important for peak performance and recovery.
- **SPORT- ENHANCING DIET**: any nutritional changes an athlete may make to their usual diet to enhance athletic performance.
- http://www.youtube.com/watch?v=Oca7PJ9A9tg&NR=1

What a Dietitian would want for you…

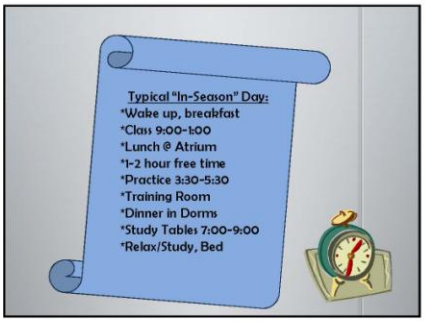
- Consume enough energy/calories through the diet to sustain energy levels and perform at optimal condition throughout the entire practice or competition
- Prevent "hitting the wall" during practice or competition
- Maintain hydration status
- Improved recovery from training or competition
- Prevent Injuries

FREQUENCY OF EATING

HOW OFTEN DO YOU EAT?

FREQUENCY OF EATING

- As collegiate athletes, your energy demands are higher
- Busy schedule so it may be easy to skip meals, eat on the run, and limit hydration
- New environment
  - No more "home" cooking
  - Dorm food
  - Fast Food, Eating on the Go
  - Limited selection



Eat Throughout the Day

- Every meal is important to the athlete
- Not being fueled = *quicker fatigue, strained performance, mental mistakes, and more soreness from the previous day*
- To meet energy needs, extremely important to give your body enough food from the time you wake up until the time you sleep
  - **Spread your calories and fluids throughout the day**
  - **Eat every 3 to 4 hours**

ESSENTIAL NUTRIENTS

- ***CARBOHYDRATES:*** *your PRIMARY energy source (like the gas that fuels the car)*
- ***PROTEIN:*** *build, repair, and maintains body tissue; only one piece of the puzzle to build/gain muscle, more muscle mass = burn more calories (like the framework of the car)*
- ***FAT:*** *necessary for good health, too much or too little can affect health and performance (like the oil that keeps the car running smoothly)*
- ***VITAMINS, MINERALS:*** *aide to body's metabolism, deficiencies could lead to problems, no caloric value*
- ***WATER, ELECTROLYTES***

BREAKFAST

- "Breaking the Fast"
- One meal you can't miss!
- Warming up your body's muscles and brain cells to function at their best
- You can have a healthy breakfast even if you are in a hurry to class or waking up for AM conditioning
- **AM workouts:** have at least something before (Gatorade, Banana, Granola Bar)
- http://www.youtube.com/watch?v=Ddm3ZSEcIE0&feature=related

EXAMPLES

- **Whole grain cereal, low fat milk, and orange**
- **Half of large bagel w/ peanut butter, small banana**
- **2 scrambled eggs with low-fat cheese on whole-wheat English muffin**
- **Fruit Smoothie made with berries, low-fat yogurt, honey, ice**
- **Hydrate**
- ***Some may need more than this….***

Breakfast on Travel Trips

Limit/Avoid	Better Options
Waffle Makers (portions are huge)	Whole Grain Cereals
Fat Loaded Muffins	Oatmeal
Sausage and Processed Meats	Whole Wheat Toast
Biscuits and Gravy	Yogurts and Cottage Cheese
Pastries	Fruit
Free Cookies	Hard Boiled Eggs
	Peanut Butter

Continental Breakfast




MEALS

- **Again, athletes should eat every 3-4 hours**
- Brings snacks for between meals! ***Avoid 5 hours without eating***
  - Trail Mix
  - Mini bagel with peanut butter
  - Carrot sticks, apples, bananas, or peppers w/ hummus dip
  - Granola/Protein Bar- Clif, Luna, Larabar
- Find place on campus that has variety + healthy choices
- Ask to join someone in grocery shopping
- ***Always be prepared to pack if needed***

Meals and Food Groups


- **Whole grains** (whole wheat bread, brown rice, whole wheat tortillas, whole wheat spaghetti, English muffins, bagels)
  - Limit refined grains (white breads, white rice, all purpose flour, etc.)
- **Fruits** (bananas, berries, apples, watermelon, kiwi, oranges)
  - Rich in vitamins, ***antioxidants***, fiber, more
- **Vegetables** (spinach, broccoli, romaine lettuce, bell peppers, onions, sweet potatoes, corn on the cob, mushrooms, etc.)
  - Rich in vitamins, ***antioxidants***, fiber, more

Meals and Food Groups


- **Low-fat dairy** (skim or 1% milk, *greek yogurt*, cottage cheese, yogurt)
- **Lean protein** (grilled chicken breast, grilled sirloin, turkey breast, cottage cheese, white fish, tuna, beans, eggs, soy, bison)
- **Healthy fats** (salmon, rainbow trout, avocados, olive oil, non-creamy salad dressings, nuts, nut butters, seeds)
  - *Avoid Saturated and Trans Fats (Solid at Room Temperature); The above are mono- and poly-unsaturated*
- Limit sweets, candy, and desserts (1 per day or 5 times per week)
- [redacted]

TRAVELING

- **Common Eateries:**
- Panera Bread, Subway, Jimmy Johns
- Olive Garden
- Cracker Barrel
- Ryan's Buffet
- Golden Corral
- Wendy's
- Pizza


Healthier Options for the Athlete:

- **Cracker Barrel/Bob Evans**
  - Vegetable Sides
  - Hearty/Healthy soups
  - Portion awareness
- **Deli Shops**
  - Whole Wheat Breads
  - Healthy Condiments
  - Lean Proteins
  - Load on Veggies
- **Italian Eateries**
  - Avoid white sauces
  - Awareness of portions
  - Easy on the breadsticks
- **Buffets/Cafeterias**
  - Avoid fried foods
  - Add color to your plate
  - Veggies, Baked Potatoes, Lean Proteins
- **Wendy's/Fast Food**
  - Chili
  - Baked Potatoes
  - Grilled Chicken Sandwiches
  - Yogurts
- **Pizza**
  - Thin Crust
  - Avoid the garlic butter dip sauce
  - Toppings (veggies, red sauce, low fat cheeses, ham, pineapple, chicken)

TRAVEL OPTIONS

Want to build muscle mass?!

- Increase speed, agility, power, performance
- More complex than consuming a lot of protein
- 1) MUST eat enough carbohydrates to build muscle mass
- 2) THINK OF MUSCLE AS A SPONGE
  - Muscle can only utilize as much protein as needed– too much of any nutrient will turn to fat
  - Consume protein throughout the day
  - Every 2-4 hours: 14-30 grams of protein (females14-24 g, males 20-30 grams)

BODY FAT PERCENTAGE CHART

Body Fat %	Men	Women	Explanation
Risky (High Body Fat)	>30%	>40%	Can pose serious health risks. Ask health care professional about how to safely modify.
Excess Fat	21-30%	31-40%	Indicates an accumulation of excess fat over time.
Moderately Lean	**16-20%**	**23-30%**	Fat level is acceptable for good health.
Lean	**10-15%**	**19-22%**	Lower body fat levels than many people. This range is excellent for health and longevity.
Ultra Lean	**5-9%**	**15-18%**	Fat levels sometimes found in elite athletes.
<Risky (Low Body Fat)	<5%	<15%	Can present health risks, esp. with women. If in doubt, check with health care professional.

May need more help if…

- Tired, "hitting the wall" during practice or competition
- Fatigue during AM workouts and/or afternoon workouts (tired the rest of the day)
- Feeling starved or extreme hunger during or after practice/competition
- You feel the only way to increase energy is with caffeine or high sugar sodas
- Change in body weight (increase or decrease)

HYDRATION

HYDRATION

- FLUID INTAKE BEFORE, DURING, AND AFTER
- ONE OF THE EASIEST, CHEAPEST, and MOST *IMPORTANT* TOOLS TO ENHANCE PERFORMANCE and PREVENT INJURY

Body Fluid Facts

- **Fluid makes up approximately 55%-65% of body weight**
- **Skeletal muscle made up of ~70% water**
- **Water acts as a shock absorber (prevents injuries!!)**
- **Not Good if water deprived**

THINGS TO CONSIDER:

- Extreme heat, Cold temperatures, High-altitude
- Athletic gear (Football vs. Swimming vs. Golf….)
- Exercise duration and Intensities
- Individual Preferences (Water vs. Sports Drink)
- Alcohol, Caffeine, Diuretics (promote dehydration)

*2009 study found 66% of Division 1 athletes were **under-hydrated *before* their training**. Males at greater risk.

*Study showed some Football Players lost 3.4 liters fluid per training session

WATER VS. SPORTS DRINK

- Water is great if competition 60 minutes or less
- 60-90 minutes or longer… A 6-8% carbohydrate solution sports drink recommended
  - Gatorade, Powerade
  - Carbohydrates and Electrolytes
  - If too sugary, water down
- Energy levels are maintained if the sports drink is consumed throughout the activity
- 30-60 grams CHO per hour

Gatorade Nutrition Label

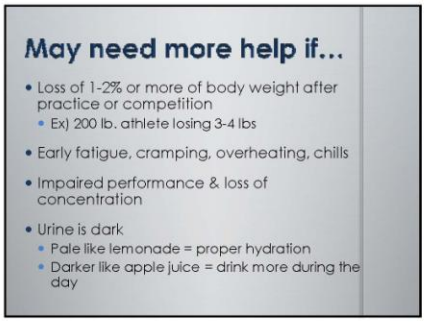
DAILY SUGGESTIONS

- **Bring a water bottle with you (bus trips too)**
- **Use extra money from your meals to buy water, sports drinks, etc.**
- **Cardinal Cash… use the $ wisely**
- **FIND FLUID IN FOODS (Eat your fruits and vegetables because they are loaded with water…along with numerous other benefits)**
- **Drink throughout the day because you should avoid feeling thirsty**
- **Limit Caffeine**
- **Avoid alcohol and diuretics**

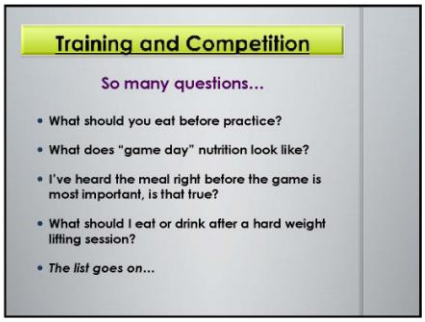
DAILY SUGGESTIONS

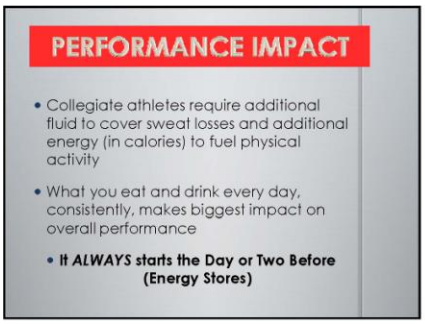
- **Personal hydration tip:**
  - ***Take half of your body weight and drink that # in fluid ounces***
  - Ex) 140 lb. person should aim for 70 ounces/day
  - Water, sports drinks, flavored water, milk, and unsweetened tea all count towards this number
  - May need more
- **Need flavor?!**
  - Add fresh orange slices
  - Propel or Crystal Light packets
  - Flavored, unsweetened teas

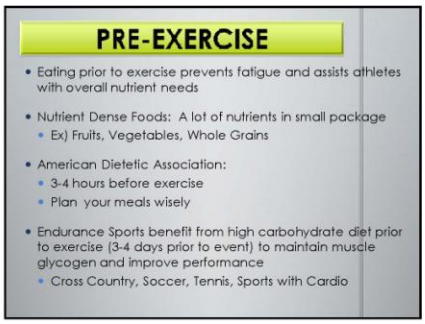

DAY OF COMPETITION
2-3 hours before training/competition drink 2 cups of water
1 hour prior drink 1 cup of water
15 minutes prior drink 1 cup
If capable, weigh yourself before training/competition
Drink fluids throughout the activity (every 15-30 minutes)
For every pound lost, drink about 3 cups of fluid
Personally experiment with what works for you


May need more help if...
Loss of 1-2% or more of body weight after practice or competition
Ex) 200 lb. athlete losing 3-4 lbs
Early fatigue, cramping, overheating, chills
Impaired performance & loss of concentration
Urine is dark
Pale like lemonade = proper hydration
Darker like apple juice = drink more during the day


TRAINING AND COMPETITION
PLAN TO PERFORM


Training and Competition
So many questions...
What should you eat before practice?
What does "game day" nutrition look like?
I've heard the meal right before the game is most important, is that true?
What should I eat or drink after a hard weight lifting session?
The list goes on...


PERFORMANCE IMPACT
Collegiate athletes require additional fluid to cover sweat losses and additional energy (in calories) to fuel physical activity
What you eat and drink every day, consistently, makes biggest impact on overall performance
It ALWAYS starts the Day or Two Before (Energy Stores)


PRE-EXERCISE
Eating prior to exercise prevents fatigue and assists athletes with overall nutrient needs
Nutrient Dense Foods: A lot of nutrients in small package
Ex) Fruits, Vegetables, Whole Grains
American Dietetic Association:
3-4 hours before exercise
Plan your meals wisely
Endurance Sports benefit from high carbohydrate diet prior to exercise (3-4 days prior to event) to maintain muscle glycogen and improve performance
Cross Country, Soccer, Tennis, Sports with Cardio

Carbohydrate Sources

- whole wheat bagel
- 1 cup of Fiber One Honey Clusters
- 1 cup whole wheat, cooked, spaghetti
- 1 cup of skim milk
- 1 slice of whole wheat bread
- Ear of corn
- 1 taco shell




Carbohydrate Sources

- 1 orange
- 1 cup carrots, cooked
- 1 cup of blackberries
- 1 packet oatmeal
- 1 banana
- 1 baked sweet potato
- 2 Fig Newtons
- 1 baked potato, with skin
- ¼ cup of raisins





CARB EXAMPLES

Carbohydrates Cont'd

- If #1 ingredient is sugar, not your best pick
- You want something easier to digest (simple carbohydrates), especially on competition days… No one wants to feel "blah" before a game, match, or event.
  - Breads, Fruits (fresh or dried), Crackers, Baked Potato


Post Training/Competition

Extremely Important, especially for those with an event within hours or days

- Replenish losses asap by consuming Carbohydrates
  - Small amount of protein added is good too
  - Snack 30 minutes after
  - Meal within 2 hours
  - http://www.youtube.com/watch?v=bBrZxcHM2ZA&feature=related

Example

- Practice from 3:00 pm-5:30 pm
- Snack at 5:45 pm (mini-wheat bagel w/ tablespoon of hummus or chocolate milk)
- Dinner at 7:00 pm

Post Training/Competition

- A Carbohydrate (66%), Protein (23%), and Fat (11%) Solution/Shake or Bar may be adequate post-exercise esp. for:
  - Two-a-days, Training in evening then following morning, unable to consume enough CHO's over next 24 hours
- Following Resistance Exercise:
  - Include Carbohydrates + Protein
  - Chocolate Milk!!! Provided by dorms and easy to find in grocery stores

Power of Chocolate Milk

- **16 ounces of low-fat chocolate milk post-exhausting exercise (8 ounces-12 ounces okay after your lifting)**
- **University of Indiana**
- Chocolate Milk vs. Carbohydrate fluid/replacement
- Chocolate Milk subjects exercised longer
  - **62% CHO, 21% PRO, 15% FAT: *a perfect balance***
  - **~90% water**
  - Calcium, Potassium, Phosphorus, Vitamins (A, D, B12), Riboflavin, and Niacin

REFUEL WITH MILK

Where could you go wrong?!

- **Make sure to eat enough calories/food the day of competition**

- **If you are starving after competition or practice, you did not optimize your performance**

OVERALL ENERGY CONSUMPTION

CALORIC INTAKE

Overall Energy Consumption

- Research study (college athletes):
  - Males- 2900 calories recommended (avg.)
  - Females- 2200 calories recommended (avg.)
    - Both males and females were eating less than recommended

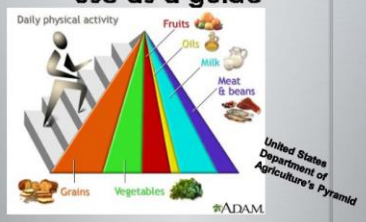
MOST ATHLETES DON'T EAT ENOUGH

(Take in consideration one athlete may have a smaller body size compared to others)

MACRONUTRIENT % PER DAY

- **55-60% Carbohydrates** (4 calories/gram)
- **12-15% Protein** (4 calories/gram)
- **25-30% Fat** (9 calories/gram)
- **NO LESS THAN 15% FAT**
  - *Alcohol has 7 calories per gram!*
- **GENERAL POPULATION:** 45-55% CHO, 10-35% PRO, and 20-35% FAT

FOOD GUIDE PYRAMID- use as a guide



PYRAMID AS *FOUNDATION*

- Example from www.mypyramid.gov :
  - 200 pound athlete, 6 foot 1
  - 18 years old with high activity level (>60 min.)
  - Recommends 3200 calories per day

10 ounces of whole grains (10 servings)
4 cups vegetables
2.5 cups fruit
3 cups milk/dairy
7 ounces meat/beans
~4 tablespoons of healthy fats
Limit extra calories (sugars, condiments, sweets)

*Use as a Base

PORTION SIZES

FOOD		1 ounce/serving	Common Portions & Equivalents
Bagels	Whole wheat	1 mini	1 large= 4 ounces
Breads	100% Whole wheat	1 reg. slice	2 regular slices= 2
Cornbread	Refined Grain	1 small piece (2 inch diameter)	1 medium pieces
Crackers	Triscuits, whole grain crackers	5 crackers or 7 saltines	
English Muffins	Whole Wheat	½ muffin	1 muffin= 2
Oatmeal	Whole Grain	1 packet, ½ cup cooked	
Cereal	Wheat Flakes	1 cup	1/3 cup granola
Pasta	Whole Grain	½ cup cooked	1 cup cooked=2
Tortillas	Whole Grain Corn	1 small (6 inch diameter)	Large (12 in. diameter)= 4

PORTION SIZES

DAIRY, PROTEIN/MEAT, AND MORE

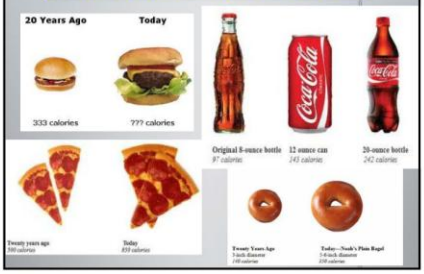
Mouse = ½ cup

Cheese portion

Cup of broccoli

Baseball = 1 cup

YESTERDAY VS. TODAY



Sack Meals at Ball State

- If you're going on a field trip for three or more days or if you'll be student teaching off campus and need lunch, you can grab a sack meal from Ball State Dining.
- Sack meals are available at Elliot Dining, LaFollette Square (America's Buffet), Noyer Center and Woodworth Commons. They will make a breakfast, lunch, or dinner for you to pick up the morning you need it. You can choose from yogurt and bagels for breakfast or a turkey sandwich for lunch and dinner. You'll also pick your beverages and condiments to be included in the lunch or dinner.
- Menu Selection

The Place to B!

What's new in BSU Dining?!

- **Three New Locations:** Jamba Juice, Quiznos, and Tom John Food Shop (Meal cards can be used)
- Fresh Sushi in LaFollete Square and Noyer Centre
- Online Menu: Find out what's new for lunch and other meals
- **Going Local:** Trader's Point Creamery in Woodworth, Hubbard & Cravens coffee around campus, produce from South Bend
- Order Online: Webfood on the BSU dining website allows for pick-up times to avoid lines
- Nutritional Information- Net Nutrition

DISORDERED EATING

EATING DISORDERS AND OTHER EATING BEHAVIORS

Where are their "flaws"?

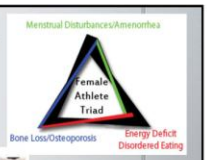
Disordered Eating

And Other Eating Behaviors of College Athletes

- **Disordered Eating:** One being somewhat-to-extremely dissatisfied with their body weight and engaging in at least one patheogenic weight control behavior in the past year.
- **Eating Disorder:** Medical illness with diagnostic criteria based on psychological, behavioral, and physiologic characteristics.
  - Anorexia nervosa
  - Bulimia nervosa
  - Binge-Eating Disorder
  - Female Athlete Triad

Attention Females:

Female Athlete Triad



Are College Athletes at Risk?

Yes.

- 15% of 35, Division 1 College Coaches, reported they instructed athletes to "go on a diet"
- Greater risk among female athletes than males
- Sports with emphasis on leanness and body image
- Study at Division 1 School: 12 sports, discovered 50% gymnasts had disordered eating,45% of cross-country athletes…
  - *1 in 3 female athletes had some form of an eating disorder/disordered eating pattern*

May need additional help…

- Negative thoughts
- Skewed body perception
- Depression, OCD
- Obsession and preoccupation with food (w/poor self-image)
- Poor sleeping habits, Mood swings
- Isolation, fear of eating around other people
- Weight gain (Compulsive Overeating)
- Low self-esteem, Guilt (not meeting expectations of themselves and others)
- Perfectionism
- Deception (lying, purging, laxatives, diuretics)
- Frequent headaches (anorexic; bulimia), Dizziness, Feeling Faint
- Always cold, Low blood pressure (low potassium in blood, vitamin deficiency)
- Dry skin, Hair loss (head hair), Hair growth (arms, back, face)
- Malnutrition and hormonal imbalances
- Obsession with exercise
- **Females:** amenorrhea (loss of menstrual cycle, 3 months or longer)

Suggestions

Finding Help

- Admitting there is a problem
- Tell someone- teammate, friend, family, coach, family doctor
- Find a Doctor
- Support- therapy, counseling, family, teammates, friends, church

Recovery

- Make a list of thoughts, feelings, and things you want to work on
- Support is extremely important, be honest with the ones that you trust
- Ball State has counseling, doctors, and people willing to help and maintain assistance
- Food as fuel source for performance, health, and recovery

BSU COUNSELING CENTER

- **Lucina Hall, Room 320**
- **Hours: 8 a.m.-5 p.m Monday-Friday**
- **Phone: (765) 285-1736**
- **Resource Room: 310-C**
- **You are eligible for full counseling services**

Vegetarians

- **7.3 million Americans are Vegetarian**
- **Plant-based, Fiber rich**
  - Avoids red meat or animal products in general (dairy, eggs)
  - May consume fish, dairy, eggs
  - Diet of vegetables, fruits, whole grains, soy, legumes, beans, nuts, seeds, etc.
  - Decrease constipation, decrease blood cholesterol levels, prevent cancers

Nutritional Risks

- **Athletes may be at risk for low calorie/energy intake**
  - Fat
  - Vitamin B12 (risk for anemia)
  - Riboflavin
  - Vitamin D
  - Calcium (bone health)
  - Iron (risk for anemia)
  - Zinc

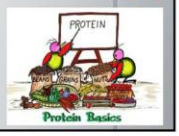
ATHLETIC IMPLICATIONS

Can be well-balanced diet, but…

- May reduce energy availability
- Athletes need *well-planned* diet to effectively support needs
- If athlete decides to avoid red meat and/or starts restricting energy intake *for leanness* then could be red flag for disordered eating patterns
- Vegetarian diets are usually lower in fat due to the plant-based food choices

Dietary Suggestions

- Consume enough calories to recover the energy/calories burned during training
- High energy foods to the diet:
  - Nuts, Seeds, Oils, Dried Fruit, etc.
- Focus on whole grain carbohydrate and protein sources; pay attention to portion sizes
- Consume enough fats
- Bring extra snacks on away trips
- Small, frequent, nutrient dense meals
- Maintain healthy body weight



May need more help if…

- Tired and/or lack of energy
- Weight Loss
- Sudden increase in the # of injuries
- Very low body fat %
- Loss of menstrual cycles (females)

CONSUMPTION OF ALCOHOL

Alcohol Consumption

- Greater sense of personal freedom
- High Risk/Heavy Drinking vs. General Student Population
- Males at greater risk for high-risk/heavy drinking
- Off-season consumption higher for both males and females

Alcohol Consumption

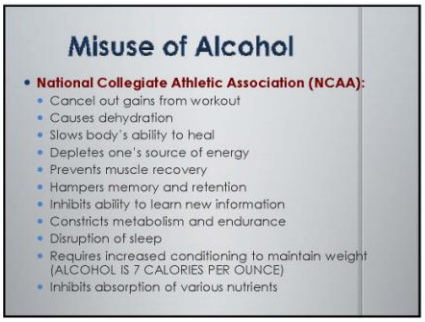
Effects of Alcohol

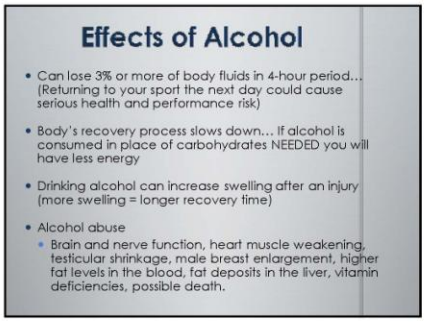
- Possibly worst thing to consume for overall performance and health
- You are required to have strength, power, speed, agility, endurance, and mentally focus. (Alcohol fears this down)
- You should not drink, even moderately, at least 24-72 hours before involvement in any type of performance that requires things previously mentioned.

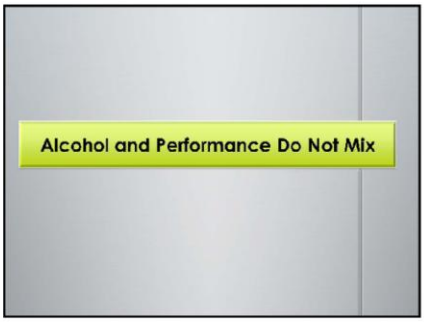
Not fun…

Alcohol

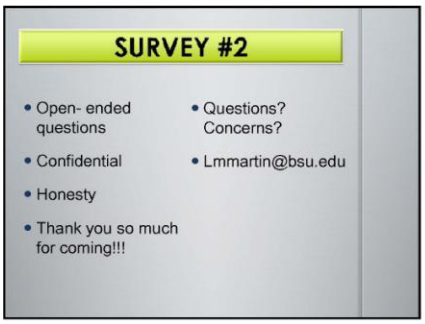
- **Moderate Drinking?**
  - No more than 1 drink per day for women
  - No more than 2 drinks per day for men
- **Heavy Drinking?**
  - For men, on average, drink more than 2 drinks per day
  - For women, on average, drink more than 1 drink per day
- **Binge Drinking?**
  - Blood Alcohol Content .08% or more
  - Within 2 hours, either 5 drinks or more for men and 4 drinks or more for women


Misuse of Alcohol
National Collegiate Athletic Association (NCAA):
Cancel out gains from workout
Causes dehydration
Slows body's ability to heal
Depletes one's source of energy
Prevents muscle recovery
Hampers memory and retention
Inhibits ability to learn new information
Constricts metabolism and endurance
Disruption of sleep
Requires increased conditioning to maintain weight (ALCOHOL IS 7 CALORIES PER OUNCE)
Inhibits absorption of various nutrients


Effects of Alcohol
Can lose 3% or more of body fluids in 4-hour period… (Returning to your sport the next day could cause serious health and performance risk)
Body's recovery process slows down… If alcohol is consumed in place of carbohydrates NEEDED you will have less energy
Drinking alcohol can increase swelling after an injury (more swelling = longer recovery time)
Alcohol abuse
Brain and nerve function, heart muscle weakening, testicular shrinkage, male breast enlargement, higher fat levels in the blood, fat deposits in the liver, vitamin deficiencies, possible death.


Alcohol and Performance Do Not Mix


Any Questions?!
(Five Minutes)


SURVEY #2
Open- ended questions
Confidential
Honesty
Thank you so much for coming!!!
Questions? Concerns?
Lmmartin@bsu.edu